



U.S. Department of the Interior
Bureau of Land Management

Salem District Office
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Salem, Oregon 97306

FINAL

September 1994

Salem District Proposed Resource Management Plan/ Final Environmental Impact Statement

Volume II Appendices



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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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Appendix A

Legal Guidelines

The following statutes and executive orders (as amended) constitute the major legal guidance for planning and management of lands administered by BLM in western Oregon. This list is not necessarily all inclusive but does represent the primary legal guidance to be considered in preparation of the Resource Management Plan.

Federal Land Policy and Management Act of 1976	43 USC 1701
The O&C Sustained Yield Act of 1937	43 USC 1181a
National Environmental Policy Act of 1969	42 USC 4321
Environmental Quality Improvement Act of 1970	42 USC 4371
Executive Order 11514, Protection and Enhancement of Environmental Quality (1970)	
Taylor Grazing Act	43 USC 315
Recreation and Public Purposes Act	43 USC 869
Unlawful Inclosures or Occupancy Act	43 USC 1061
Mining and Minerals Policy Act of 1970	30 USC 21a
Mining Act of 1872	30 USC 26
Mineral Leasing Act of 1920 (Mineral Lands Leasing Act)	30 USC 181
Materials Act of 1947	30 USC 601
Geothermal Steam Act of 1970	30 USC 1001
Geothermal Energy Act of 1980	30 USC 1501
Antiquities Act of 1906	16 USC 431
Historic Sites, Buildings, and Antiquities Act	16 USC 461
National Historic Preservation Act	16 USC 470
Archaeological Resources Protection Act of 1979	16 USC 470aa
Reservoir Salvage Act of 1960	16 USC 580m-n
Fish and Wildlife Coordination Act	16 USC 661
Bald Eagle Protection Act	16 USC 668
Sikes Act	16 USC 670a
Migratory Bird Treaty Act	16 USC 703
Migratory Bird Conservation Act	16 USC 715
Wilderness Act 16 USC 1131	
National Trail Systems Act	16 USC 1241
Wild and Scenic Rivers Act	16 USC 1271
Executive Order 11644, Use of Off-Road Vehicles on the Public Lands (1972)	
Executive Order 11989, Off-Road Vehicles on Public Lands (1977)	
Wild Free-Roaming Horses and Burros Act	16 USC 1331
Coastal Zone Management Act of 1972	16 USC 1451
Endangered Species Act of 1973	16 USC 1531
Soil and Water Resources Conservation Act of 1977	16 USC 2001
Executive Order 11988, Floodplain Management (1977)	
Executive Order 11990, Protection of Wetlands (1977)	
Coastal Barriers Resources Act	16 USC 3501
Land and Water Conservation Fund Act of 1965	16 USC 4601-4
Federal Water Pollution Control Act/Clean Water Act	33 USC 1251
Safe Drinking Water Act	42 USC 300 (f)
American Indian Religious Freedom Act	42 USC 1996
Resource Conservation and Recovery Act of 1976	42 USC 6901
Clean Air Act	42 USC 7401
Comprehensive Environmental Response, Compensation and Liability Act of 1980	42 USC 9601
Emergency Planning and Community Right-to-Know Act of 1986	42 USC 11001

USC = United States Code

Appendix B

Key Sections of the 1993 Record of Decision on Pacific Yew Environmental Impact Statement

The following is excerpted verbatim from the *Record of Decision, Pacific Yew*, September 1993. (The remainder of the record of decision is incorporated by reference).

The Decision

It is our decision to select alternative B as the Pacific yew harvest strategy for the National Forest System lands and lands administered by the Bureau of Land Management in Washington, Oregon, California, Idaho, and Montana for the next five years (1993 through 1997). Our selection of alternative B is based on the analysis in the final environmental impact statement, consideration of public comments on the draft environmental impact statement, and a significant reduction in demand for yew from federal lands for taxol production.

Alternative B permits harvest of any part of the Pacific yew for taxol production from timber sale units and where it might otherwise be destroyed. For the purpose of this document, timber sale units are defined as any area within a timber sale which has a silvicultural prescription for a clearcut¹, shelterwood¹, or seed tree¹ harvest method. Pacific yew may also be harvested for taxol from other areas where the yew would otherwise be destroyed by such activities as other timber harvesting, road building or other construction, a prescribed fire treatment, or similar activities. Site-specific environmental analyses are required before any yew harvest takes place.

We recognize that other parts of the yew, such as seed or scion material, may be needed for research or propagation purposes. This decision permits nondestructive harvest (where tree or shrub is not killed) of small quantities of such material for these purposes in any area where allowed by forest plans, BLM resource management plans (draft or final), or new agency resource plans.

Under this alternative, 258,000 to 386,000 pounds of dry bark and/or 686,000 to 1,030,000 pounds of dry needles from an estimated 52,000 to 78,000 yew would be available each year for harvest from National Forest System and BLM lands. These estimates are based on the number of yew per acre found in the 1992 Pacific yew inventory and the projected number of acres for timber sales described in forest plans and adjusted according to the Final Environmental Impact Statement for Management for the Northern Spotted Owl in National Forests (for Forest Service) or in draft resource management plans (for BLM). Many other decisions are currently being made that will most likely reduce the number of timber sale acres and therefore reduce the number of available yew trees and pounds of bark and needles. Under Alternative B, the production of yew from federal lands is largely dependent on the timber harvest program.

Alternative B provides for protection of some of the yew remaining after yew harvest; every sale unit would be regenerated to preharvest or prescribed levels. Special genetic reserves would not be established; however, all acres not committed to timber sales as defined above, would function as genetic reservoirs.

In summary, alternative B emphasizes utilization of Pacific yew where it would otherwise be wasted. Production of yew would be dependent on the Forest Service and BLM timber harvest programs. It affords the highest degree of protection to the yew by virtue of allowing the lowest level of harvest (with the exception of alternative A).

Mitigation Measures

The mitigation measures in the final environmental impact statement were developed using "An Interim Guide to the Conservation and Management of Pacific Yew, as revised April 1993"² as well as suggestions from the public. They were designed to protect the yew and the ecosystem. All practical means to avoid or minimize environmental harm from the selected alternative have been adopted. The mitigation measures for alternative B follow. These apply only to areas where yew is harvested for taxol.

- If a timber sale is planned in a unique area where the only yew in the drainage is located in the sale area, then mitigation is required to assure the protection of this yew population. The purpose for this would be to protect the genetic importance of this unique population from timber sale unit locations.
- Consider including vigorous, undamaged yew trees or shrubs in the green tree reserves whenever possible.
- Harvest yew only where practical (i.e., sufficient number of stems of utilizable size).
- Where yew harvest is planned, harvest yew in the sale unit prior to the harvest of other tree species, to the extent that timber harvesters' health and safety will not be jeopardized. Preharvesting may be accomplished by decking yew logs in specific locations within the sale unit during logging operations.
- Harvest yew that is not in the residual green tree reserve.
- Do not harvest yew for the primary purpose of yew products within 75-foot slope distance from the average high-water level of a perennial stream. Where forest plans, resource management plans, or other plans or prescriptions set wider streamside buffers, these greater buffers will be adhered to.
- Site-specific prescriptions will identify logging systems, site preparation and fuels reduction treatments, and conifer regeneration plans with regard to yew survival and regeneration.
- Use one or more of the following methods to maintain or replace yew on the site at preharvest levels. Where preharvest yew densities are estimated to be greater than 50 yew plants per acre, then a minimum of 50 yew plants per acre will be prescribed in site-specific prescriptions.
 1. Retain and protect as much of the residual yew (stumps, trees, shrubs, advanced regeneration remaining after harvest) as possible and practical from post-harvest activities such as slash piling and burning. Plan logging systems and slash disposal methods which favor the survival of residual yew plants and stumps, e.g., grapple piling or combined machine and burning methods or special burn prescriptions. Include retention of yew and yew stumps as one of the prescribed fire objectives in burning plans. Leave litter and down wood in those patches for seedling establishment.

Protect yew stumps by the following:

 - a. To facilitate sprouting, leave yew tree stumps at the scientifically recommended height (currently 12 inches high). Yew shrubs should be cut to leave a similar length from the root collar.
 - b. Leave bark intact on yew stumps.
 - c. Whenever possible and practical, shade yew stumps with slash or adjacent vegetation and position reserve green trees to provide shade for yew stumps and advanced yew regeneration. Shading is not normally necessary on shrub form yew; site-specific analysis may help determine how much shading is needed.
 2. Encourage natural regeneration (from seed already present on site) by using any site preparation methods known to favor yew seed germination and establishment. Site-specific prescriptions will provide seed sources and desired site conditions for natural regeneration of yew and protect concentrations of existing yew where feasible, while still meeting other management objectives. Where on-the-ground conditions preclude this, planting of yew will be prescribed.
 3. Plant seedlings according to site-specific prescriptions if prescribed regeneration of yew has not been achieved and there is assurance that regeneration by other means is not occurring. Obtain rooted cuttings or seed or seedlings from sources within the local management area. Cuttings could be collected before harvest. Animal protection measures need to be considered where browsing of young yew is predicted. Refer to "An Interim Guide to the Conservation and Management of Pacific Yew," page 27, for transfer of genetic material guidelines.
- **Monitoring** Where possible, monitor yew regeneration in conjunction with normal regeneration and other area surveys.
- **Endangered Species Act Consultation** Yew harvest will be conducted in accordance with all conditions, restrictions, and monitoring procedures that are developed during project level Section 7 consultation required by the Endangered Species Act.
- **Seasonal Restrictions for Listed Species** Pacific yew harvest will follow the appropriate seasonal restrictions for the affected listed species indicated during the project level (site-specific) Section 7 consultation required by the Endangered Species Act.

- **Utilization of Yew Material** Follow current Forest Service and BLM policies for utilization of yew wood, bark, and needles. These policies may differ between Forest Service regions or national forests or between BLM districts.
- **Transfer of Yew, Administration of Permits, and Theft Prevention** Follow current Forest Service and BLM policies for transfer of yew, administration of permits, and theft prevention.
- **Tribal Treaties** Comply with all Native American tribal treaties and consult with tribes where yew harvest may impact trust lands.

Monitoring

Monitoring yew harvest, yew survival and regeneration, and protection of other resources will be guided by Forest Service and BLM harvest policies and requirements in forest plans and resource management plans, as well as monitoring identified in site-specific analyses. The final environmental impact statement requires that yew regeneration be monitored in conjunction with other conifer regeneration surveys (see appendix B-1 in the final environmental impact statement).

- ¹ Harvest method terminology may change. These terms may be replaced with their equivalents using ecosystem management or other terminology.
- ² U.S. Department of Agriculture, Forest Service, 1992. An Interim Guide to the Conservation and Management of the Pacific Yew. Pacific Northwest Region. 78 p.

Appendix C

Public Involvement

Public Involvement Prior to Publication of the Draft Resource Management Plan

Public involvement has been an integral part of the BLM's resource management planning process. Public involvement activities have included a series of information mailers or brochures, public meetings, open houses, field trips, distribution of planning documents, document review and comment periods, informal contacts, group meetings, and written letters and responses to comments.

Public involvement efforts began in May 1986, when the BLM Oregon state director sent a mailer to the public entitled "Public Involvement Planning for the 90s". The mailer asked for comments on the type of public involvement activities that should be conducted in the planning process.

In September 1986, the Salem District Office sent a mailer to some 600 parties outlining the overall planning schedule and requested comments on the first major planning step, issue identification. BLM invited the public to identify issues or concerns they believed should be addressed in the resource management plan. During this planning step, the district hosted an open house to acquaint citizens with the planning process and schedule and to discuss issues related to the planning process.

With the comments received, the district's planning team and managers distilled a list of issues and concerns. The BLM defined an issue as a matter of controversy or dispute over resource management activities or land use that is well defined or topically discrete and can be addressed in the formulation of planning alternatives. In practice, issues are resolved by resource allocations and restrictions. Concerns, on the other hand, are generally not so well defined, or do not directly involve controversy or disputes over resource management activities or land use allocations, and do not lend themselves to formulating land use alternatives. Concerns are usually addressed by analysis and documentation in the proposed resource management plan. Some concerns are not addressed by this document, as they are beyond the control of the state director, are unrelated administrative problems, or are not within the legal jurisdiction of BLM. The issues and concerns identified are described in chapter 1.

Building on public comments received during the issue identification step, BLM prepared another district mailer. Distributed in March 1987, it summarized BLM-identified issues to be analyzed in the resource management plan and concerns which may be addressed. The public was asked to review those issues and possible concerns and provide comments. The mailer also addressed the second and third planning steps: development of planning criteria including state director guidance and collection of inventory data. The mailer disclosed a proposed element of planning criteria by identifying a proposed timber harvest computer model and an opportunity for public comment on that model.

In August 1987, the BLM Oregon state director distributed another mailer, "Planning for the Public Lands in Western Oregon: Proposed State Director Guidance Topics" dealing with planning criteria and proposed state director guidance. This mailer requested comments on relevant topics for Oregon State Office guidance and included a schedule for public demonstration of the proposed timber harvest computer model. Demonstrations were conducted in Roseburg and Portland in September 1987. The sessions included comparison and discussion of other harvest models with Trim-Plus and a demonstration of how the model works.

In January 1988, a mailer was distributed informing the public of the upcoming availability of the state director guidance document. The draft, "Planning for the Public Lands in Western Oregon: Proposed State Director Guidance", was mailed to all who requested copies. Additional copies were available in all district offices. State director guidance is presented in appendix D.

The following Dear Concerned Citizen Letters were sent from the BLM Oregon state director to the public: May 1988; the letter contained BLM's responses to public comments on alternatives requested by the August 1987 mailer. April 1989; this letter contained revisions of proposed state director guidance on the formulation of alternatives and analytical techniques to estimate the effects of alternatives. It also contained BLM responses to public comments on previous BLM guidance documents and letters on alternatives and analytical techniques. March 1990; this letter contained a refinement of state director guidance for assessing effects on biological diversity and effects on soil productivity. It also contained BLM responses to public comments on proposed techniques to analyze soil productivity. June 1990; this letter referred to the proposed guidance for formulation of resource management plan alternatives and included BLM responses to the comments received on the April 1989 draft of proposed guidance on alternatives. July 30, 1991; this letter contained information on guidance and formulation of the alternatives and included revised guidance on analytical techniques; use of the completed plan; consistency with natural resource related plans, programs, or policies of other agencies; and BLM responses to the comments received on these sections.

An Analysis of the Management Situation was drafted in 1990 and a summary was completed in January 1991. The district made a concerted effort to inform the public about availability of the documents for review and comment. The scope of the effort is reflected in the following statistics:

- 75 copies of a preliminary Analysis of the Management Situation summary distributed to the public before, during and shortly after the first public meeting;
- 800 copies of the printed analysis of the management situation summary distributed to the public; and
- 16 public meetings held in 8 communities in the district; 240 people participated in the meetings.

There were 399 public comment responses received, including 18 duplicate responses (identical content and signature) which were recorded only once. Not counting duplicates, there were 320 individual letters or postcards, 43 comment sheets, 11 form letters, 3 petitions, and 4 telephone interviews. The total number of signatures was 732. There were 2,638 individual comments, issues, and concerns stated in these letters and processed in the comment analysis.

The process used to record and analyze incoming responses included the following steps:

1. Assign an identification number to each individual response.
2. Make copies for coding and for management and planning team review.
3. Place original response in case file to be retained until after the resource management plan is completed.
4. Read each response noting any comments requiring immediate attention, and refer to the appropriate resource specialists or area manager for response.
5. Record demographic information and input into computer database.
6. Code responses according to topic discussed, opinion expressed, and reason for the opinion.
7. Enter coded information into computer database.
8. Access database to obtain desired information.

Demographic information was recorded and analyzed to gain an understanding of places of residence, types of response, affiliations with a group or organization, and the number of signatures on each response. The demographic information was used to expand and refine the existing resource management plan mailing list and will assist in future public outreach efforts.

An analysis of all comments relevant to the Analysis of the Management Situation was completed. The purposes of this analysis were to summarize information and suggestions contained in the responses and to develop summary tables and reports. The reports allowed resource management plan writers and managers to:

- (1) identify respondents' concerns, opinions and underlying reasons, as well as new ideas and information; and
- (2) categorize these comments into an orderly summary sheet for decision makers.

Responses were received from 61 localities in six states (California, Oregon, Hawaii, Virginia, Washington, and Wisconsin), Washington D.C., and England. The majority of responses were from localities most likely to be affected by resource management plan decisions. Respondents from five of these localities were by and large interested in only one issue specific to their locality. Respondents from Corvallis were primarily concerned with

the Marys Peak issues while respondents from Alsea, Tidewater, and Waldport were mainly concerned with potential wild and scenic river designations in their area. The majority of letters from Sandy and Welches dealt with the potential Mt. Hood Corridor Special Recreation Management Area proposal. Respondents from the remaining localities discussed a wide range of topics.

The entire analysis and a more detailed summary are available for review in the district office.

In public comments and internal discussions, there were a number of alternatives, or potential elements of alternatives, considered but eliminated from detailed analysis. These are summarized in the following discussions:

- Alternatives that would meet specified timber production target levels (e.g., one identified in a regional supply analysis or one that would maintain the level in existing plans). Such alternatives could be explicitly designed only with an optimization model. Early in the planning process, the BLM chose not to invest the many millions of dollars that would have been necessary to adopt and use an optimization model in its western Oregon planning effort.
- Alternatives that explicitly reflect the policies and programs of the Oregon and California counties, and of the state. Until opportunities and trade-offs are fully analyzed, such alternatives could not be formulated. At that point in the process, it was the BLM's intent to develop a preferred alternative consistent with those policies and programs to the extent they are consistent with each other and also consistent with federal laws and regulations.
- An alternative based on the assumption that Federal Land Policy and Management Act, rather than the Oregon and California Act, was the predominant statutory mandate for management of the Oregon and California lands. None of the initial set of alternatives was based on a specific real or assumed statutory mandate. The BLM believes that management under the Federal Land Policy and Management Act falls within the range established by the initial set of alternatives.
- A no planned timber harvest alternative. The BLM considers such an alternative for all BLM-administered lands in western Oregon outside the reasonable range of alternatives. The counterpart of a no timber harvest alternative would be an alternative that would remove all merchantable timber over the life of the plan. Such a radical departure from sustained yield principles on either end is clearly outside the reasonable range of alternatives.
- Alternatives considering neither intensive management practices nor the allowable cut effect in setting an allowable sale quantity. The impact of foregoing these can be identified from the sensitivity analysis of the preferred alternative.
- An alternative which would forego slash burning; one that would forego use of herbicides. These activities and the options of foregoing them were addressed in BLM's vegetation management environmental impact statement (U.S. Department of the Interior, BLM 1989). This proposed resource management plan is tied to that environmental impact statement.
- An alternative that uses uneven-aged management as the predominant silvicultural system. In many locations that prescription would fail to meet reforestation standards, a violation of the sustained yield mandate. Uneven-aged management is considered for use in stands where it would be economically and environmentally feasible and reforestation standards could be met.
- An alternative which excludes site IV lands from timber harvest. Such an alternative would not address any important environmental or resource management objectives better than options already being addressed.
- An alternative that maximizes timber production subject to the constraint of economic feasibility. Analysis of the economic feasibility of alternative A showed that such a constraint would negligibly affect the allowable sale quantity of that alternative.
- Alternatives which vary in size of spotted owl habitat protected for each nest site. In light of the Interagency Scientific Committee report and subsequent proposals by the U.S. Fish and Wildlife Service, the BLM concluded that such variation had little relevance.
- An alternative that would protect 110 spotted owl areas, as provided for in the 1987 revised BLM-Oregon Department of Fish and Wildlife agreement, was originally proposed by BLM. After the Interagency Scientific Committee report was released in 1990, this alternative no longer seemed relevant.
- An alternative that manages as visual resource management class II all lands inventoried as visual resource management classes III and IV. Such an alternative would only be logical if matched with the other goals of an

alternative with a very constrained timber harvest base. This management option, intended to optimize protection of scenic values even on areas identified in inventories as low in scenic value. It was felt to be too arbitrary to warrant its application as an additional constraint to alternatives that severely restrict timber production to emphasize more meaningful objectives.

- An alternative protecting a minimum of one-quarter mile-wide riparian management areas along third order and higher streams, class I streams and other waters; and maintaining and enhancing water quality at the highest level of water quality required for municipal use. Such an alternative would exclude almost all commercial forest lands from timber management. Such extensive riparian management areas would exceed what is needed to protect water quality and riparian values. Thus, it was considered outside the range of reasonable alternatives.

Public Involvement Following Publication of the Draft Resource Management Plan

The draft resource management plans for western Oregon were distributed for public review in the fall of 1992.

Prior to and after the plans were distributed, there were numerous formal briefings and informal meetings with non-BLM groups and individuals that covered all six western Oregon draft plans. These were usually coordinated by BLM's Oregon State Office, although the formal briefings were led by former Eugene District Manager, Ron Kaufman. The following is a list of formal briefings:

7/20/92	U.S. Fish and Wildlife Service, Portland, Oregon
8/6-13/92	U.S. Forest Service, Washington D.C. Senator Bob Packwood Senator Mark Hatfield (staff) Senator Slade Gorton (staff) Congressman Les AuCoin (staff) Congressman Norm Dix Congressman Peter DeFazio (staff) Congressman Peter Kopetski Congressman Bob Smith Congressman Ron Wyden BLM Washington Office Staff Assistant Secretary of the Interior and Staff Professional/Conservation Groups, Washington D.C. House Interior Appropriations Staff Senate Interior Appropriations Staff Oregon and California Counties Executive Board
8/19/92	Environmental Groups (Oregon)
8/20/92	Industry Associations (Oregon)
8/28/92	District Advisory Council
9/08/92	Governor's Forest Planning Team
9/16/92	Scientific Review Panel
9/17/92	Willamette Timbermen
9/22/92	Lane County Tax Equalization Group
10/6/92	U.S. Forest Service, Willamette National Forest
10/8/92	Oregon State University Faculty
10/9/92	Willamette Forestry Council
10/21/92	Society of American Foresters, Portland, Oregon
10/26/92	Society of American Foresters, Eugene, Oregon
10/27/92	University of Oregon Faculty
11/2/92	University of Washington Faculty
11/10/92	Society of American Foresters, Roseburg, Oregon

Salem District Public Involvement

The Salem District informed and updated the public on the preparation and release of the draft resource management plan through a newsletter, "Salem District Planning For The 1990s". The newsletter was mailed to interested publics in May 1989, July 1991, April 1992 and September 1992.

The Salem District Draft Resource Management Plan was released for public review on August 28, 1992. The Federal Register Notice was printed on August 28, 1992 (Vol. 57, No. 168, pg. 39199).

The Salem District held 16 public meetings in the afternoon and evenings to dispense information, answer questions and solicit input regarding the draft resource management plan/environmental impact statement. Approximately 135 people attended these meetings which were held in Brightwood, Corvallis, Dallas, McMinnville, Mill City, Molalla, Philomath, Salem, Scappoose, Sweet Home, and Tillamook.

Personnel from the Salem District also briefed the following individuals and organizations on the draft resource management plan:

2/25/92	Linn Tourism Coalition
3/12/92	Linn County Sheriffs Department
3/18/92	North Santiam Chamber of Commerce
4/10/92	Linn Fire Protection Association
6/30/92	Linn County Commissioners
7/21/92	Linn County Commissioners
8/19/92	Association of O&C Counties
8/20/92	O&C Board of Directors
8/26/92	Salem District Advisory Council
9/1/92	Oregon Department of Fish and Wildlife
9/3/92	Willamette Timber Operators
9/16/92	State of Oregon Resource Management Plan Review Team
9/24/92	Spotted Owl Recovery Review Team
9/27/92	U.S. Fish and Wildlife Service
9/28/92	U.S. Forest Service
10/7/92	Linn County Commissioners
10/27/92	Spotted Owl Recovery Team
10/29/92	Spotted Owl Recovery Team
11/5/92	Benton County Commissioners
11/12/92	Tillamook County Economic Development Committee, Forestry Subcommittee
11/24/92	Tillamook County Commissioners
12/4/92	Governor's Forest Planning Team
12/8/92	Committee for Greater Oregon
12/9/92	Linn Forest Protection Association
12/16/92	Rep. Liz VanLeeuwen, Dr. Ben Stout and Marlin H. Aerni (United Paperworkers International Union)
3/15/93	Oregon Department of Fish and Wildlife, Habitat Conservation Division

As part of the planning process, the Salem District solicited public comments on its draft resource management plan. During the 120-day comment period the district received comments through letters, petitions, personal contacts, and public meetings. The district accepted comment letters past the official closing date of the comment period, and if time allowed, used these comments. The original comment letters are on file at the Salem District Office and are available for review by the public. Comment letters from government agencies are reprinted in appendix II.

The public comments were analyzed so meaningful changes could be made in the development of the proposed resource management plan. Substantive comments were the most useful in development of the proposed resource management plan, although all comments were reviewed and considered in revising the draft resource management plan.

Appendix C

The National Environmental Policy Act of 1976 requires BLM to respond to substantive comments received during a comment period. Responses to the substantive comments are in appendix JJ.

Each letter was considered valuable whether it contained substantive comments, opinions, feelings, suggestions, or observations. Each comment was evaluated on its own merit against legal and technical information, resource capability, and public opinion. The use of public comments was not a vote counting process.

Each letter received a date stamp and an identification number upon arrival at the Salem District mail room. The original letter was stored in central files and a copy was routed to the public input analysis team.

A public input analysis team read each letter in its entirety. Substantive comments and preferences and opinions were identified, coded according to demographics, and entered into the computer data base. This process provided computer generated reports to management and the resource management plan team. Each letter was also routed to the district manager and area managers for their review and consideration in making appropriate changes reflected in the proposed management plan.

The Salem District received 783 letters: 262 individuals, 2 petitions, 2 resolutions, 10 comment sheets and 507 form letters. Most letters had more than one comment. There were 1,670 comments including preferences and opinions.

Letters were received from Georgia, Minnesota, Oregon, and Washington.

Representation of the 783 letters breaks down as follows: Organizations, 68; federal government, 6; state government, 3; local government, 7; and individuals, 699.

The following table indicates the number of comments received according to major topics, resource elements, or resource management plan alternatives.

Topic	Number of Comments	Topic	Number of Comments
Biological Diversity	264	Visual Resources	16
Cultural Resources	2	Water Quality	61
Energy and Minerals	7	Wild and Scenic Rivers	64
Fire	11	Wildlife	48
Fish	73	RMP/EIS (general)	127
Funding	12	Alternative A	8
Lands, Rights-of-Way, Withdrawal	25	Alternatives A and B	1
Recreation	72	Alternative B	10
Riparian Resources	103	Alternative C	2
Roads	17	Alternatives C and D	1
Rural Interface Areas	14	Alternative D	3
Socioeconomic Conditions	171	Alternatives D and E	1
Soils	28	Alternative E	21
Special Areas	69	No Action Alternative	9
Special Status Species	171	Preferred Alternative	301
Timber	207	All Alternatives	8
Vegetation	32		

Since August 1992, the district has continued to keep the public informed of plan development through periodic newsletters.

Appendix D

State Director Guidance for the Resource Management Plan Process

According to Bureau regulations for preparing resource management plans, "the State Director shall provide quality control and supervisory review, including plan approval, for plans and related environmental impact statements and shall provide additional guidance, as necessary, for use by district and area managers." "Guidance" means "any type of written communications or instructions that transmits objectives, goals, constraints or any other direction that helps district and area managers and staff know how to prepare a specific resource management plan."

Early in the process of concurrently preparing this resource management plan and five other resource management plans which together cover all BLM-administered lands in western Oregon, the BLM state director decided to develop comprehensive procedural guidance as planning criteria to assure consistent treatment of a variety of issues and concerns in the six plans. The intent to do this was conveyed to known interested parties in a mailer sent out by each BLM district office with planning responsibility on March 27, 1987. Suggestions for content of that guidance were solicited in the mailer.

There was limited public response, but that response, along with internal BLM recommendations, led to formulation of a proposed set of topics for state director guidance. A mailer describing those topics were sent to the public for comment on August 11, 1987. Using further but still limited public comments, BLM modified its list of topics slightly and drafted Proposed State Director Guidance, which was sent out for public review by interested parties on May 13, 1988.

Although less than a hundred individuals and groups responded, many of the comments received were thoughtful and constructive, and addressed the proposals in depth. BLM undertook a substantial revision of many sections of the proposed guidance. This revision was done on a staggered schedule, to distribute the workload and provide timely guidance to the districts for each step in the process.

The first element of the guidance completed was Guidance for the Preparation of the Analysis of the Management Situation. This document summarizes important information about existing resource conditions, uses and demands, as well as about management activities and natural relationships. It provides the baseline for subsequent steps in the planning process, such as the design of alternatives and analysis of environmental consequences. The analysis of the management situation also provides most of the data to be summarized in the "affected environment" chapter of the environmental impact statement. The analysis of the management situation guidance prescribed minimum contents and table formats for the analysis of the management situation for each plan. That guidance was essentially completed in October 1988, and slightly revised during 1989 and 1990.

A master glossary for the analysis of the management situation was prepared as part of the State Director Guidance. It was completed in 1989, and later revised for inclusion in each draft resource management plan.

The Guidance for Formulation of Alternatives was essentially completed in October 1990 but underwent modest revision during 1991 and 1992. A copy of the final version of this guidance is included in this appendix.

Two other sections, Guidance for Analytical Techniques Needed to Estimate Effects of Alternatives and Guidance for Use of the Completed Plan, were completed in July 1991, with slight modification of the former in 1992. Descriptions of complex analytical techniques have been appendicized to discussions of the relevant analyses in Chapters 3 and 4. The Use of the Completed Plan section was wrapped into the equivalent section of Chapter 2 of the draft resource management plan/environmental impact statement.

The original draft guidance had two other sections that never became final. Guidance for the Executive Summary was dropped because the State Director's staff prepared that summary. Guidance for expressing consistency with plans, programs and policies of other agencies was never formalized, as BLM staff worked with state agencies and county planners until the Draft RMP/EISs were almost complete, on ways to express such consistency.

Guidance for Formulation of Alternatives

Introduction

The purpose of alternatives is to identify a range of reasonable combinations of resource uses and management practices that respond to planning issues and provide management direction for all resources. Five common alternatives will be addressed in each RMP, to provide a consistent set of distinct choices among potential management strategies.

A no change from the existing land use plan alternative will also be addressed. This is the "no action" alternative. In the other alternatives all existing land use decisions not found valid for continued implementation after 1990 (through an analysis summarized in the Analysis of the Management Situation), will be reconsidered.

Common alternatives that identify specific management actions along District boundaries will be consistent. Examples include elk management areas, spotted owl corridors or visual corridors.

This Guidance for Formulation of Alternatives may be modified later based on information identified in the districts' analyses of the management situation, or refinements that flow from the districts' site-specific development of common alternatives.

Goals and Objectives of the Common Alternatives

The purpose of the goal and objective statements for the five common alternatives (A through E) is to guide development of specific criteria. Each alternative, if implemented, is intended to achieve or meet its goal. Goal and objective statements focus on general direction of alternatives rather than technical points in issue-related criteria for the alternatives. In each alternative all resource management values would be accommodated to the extent consistent with the primary goals and objectives for that alternative.

Specific Guidance on Common Alternatives

The common alternatives would differ primarily in the way they allocate primary uses of lands (for example, lands allocated to intensive forest management, and lands allocated to protection of riparian zones).

The discussion on pages D-6 through D-19 describes criteria for addressing each of the eleven planning issues in the formulation of the common alternatives. It also describes how land use allocations and management actions would vary in response to each issue. Within the specific constraints provided by the guidance for addressing each issue, the districts have flexibility to formulate the common alternatives as they consider appropriate to meet the goals and objectives of each alternative.

Alternative A

Alternative B

Goals

Emphasize high production of timber and other economically important values on all lands to contribute to community stability.

Emphasize timber production to contribute to community stability consistent with the variety of other land uses such as fish and wildlife habitat, recreation, and scenic resources on Oregon and California and Coos Bay Wagon Road lands. Give equal consideration to all resource values on public domain lands.

Objectives

- Produce the highest sustained yield of timber on all suitable forest lands legally available for harvest.
- Contribute to ecological functions important to timber productivity and to habitat diversity to the extent possible consistent with the allocation for timber production.
- Manage threatened and endangered species habitat as legally required.
- Provide research natural areas and eligible areas of critical environmental concern to the extent consistent with the allocation for timber production.
- Manage appropriate congressionally designated areas to maintain and enhance their scenic values.
- Meet legal requirements for protection of wetlands and water quality, to protect anadromous fish habitat and other relevant values.
- Emphasize substantial developed and dispersed motorized recreation uses.
- Find no additional rivers suitable for designation under the Wild and Scenic Rivers Act.
- Make land tenure adjustments which enhance BLM long-term sustained yield timber harvest opportunities.
- Provide no special management in rural (residential) interface areas.
- Produce a high sustained yield of timber on Oregon and California and Coos Bay Wagon Road lands, and on public domain lands where nontimber uses and values are of lesser importance than timber production.
- Contribute to ecological functions important to timber productivity and to habitat diversity using a system that maintains old growth and mature forest in large and small blocks.
- Protect habitat of all threatened and endangered species and species with high potential for listing. Protect habitat of other species of substantial concern to the extent consistent with high timber production.
- Retain existing research natural areas and areas of critical environmental concern. Provide new ones from eligible areas to the extent consistent with the emphasis on timber production.
- Manage scenic resources in selected areas of high recreation use.
- Meet legal requirements for protection of wetlands and water quality and provide moderate additional protection for anadromous fish habitat, other substantial streams, and other water.
- Provide for a wide range of developed and dispersed motorized recreation uses and opportunities, to minimize conflicts among recreation user groups.
- Find eligible river segments suitable for designation as recreational, if they are important and manageable, and designation would not cause adverse economic impact.
- Make land tenure adjustments which enhance BLM long-term sustained yield timber harvest opportunities on Oregon and California and Coos Bay Wagon Road lands, and which benefit a variety of uses and values on public domain lands.
- Adopt appropriate special forest management practices on BLM-administered lands intermingled with or adjacent to rural interface areas zoned for most dense residential occupancy.

Alternative C

Provide timber production to contribute to community stability consistent with maintenance of biological diversity and the variety of other uses such as fish and wildlife habitat, recreation, and scenic resources on all lands.

- Produce a moderate sustained yield of timber.
- Provide biological diversity using a system that maintains some old growth and mature forest, focusing on protection of areas where special status plant and animal species cluster.
- Protect habitat of all threatened and endangered species and species with high potential for listing. Protect habitat of other species of substantial concern through emphasis on biological diversity and to the extent consistent with moderate timber production.
- Retain existing research natural areas and areas of critical environmental concern. Provide new ones from eligible areas except where lands managed by others are considered to provide more appropriate opportunities.
- Manage scenic resources in selected high use areas, particularly emphasizing protection in corridors of existing and proposed wild and scenic rivers and major trails.
- Provide substantial protection for anadromous fish habitat, other substantial streams and other water environments.
- Provide for a wide range of recreation opportunities emphasizing dispersed use, while reducing conflicts among recreational user groups.
- Find eligible river segments suitable for designation as scenic or recreational, if they are important and manageable, but not suitable for designation as scenic if designation would cause adverse economic impact.
- Make land tenure adjustments to benefit a variety of uses and values.
- Adopt appropriate special forest management practices in rural interface areas zoned for moderate or high density residential occupancy.

Alternative D

Emphasize protection and reestablishment of spotted owl habitat, along with management and enhancement of other values such as dispersed nonmotorized recreation opportunities and scenic resources, while sustaining some timber production.

- Produce a sustained yield of timber consistent with allocations for other uses and values.
- Protect habitat of the spotted owl in accordance with the Owl Conservation Strategy.
- Protect habitat of all threatened and endangered species, species with high potential for listing, and species of related concern.
- Retain all existing research natural areas and areas of critical environmental concern. Provide new ones from eligible areas except where lands managed by others are considered to provide more appropriate opportunities.
- Manage all identified scenic resources.
- Provide substantial protection for wetlands and riparian areas along most streams and other water.
- Emphasize dispersed nonmotorized recreation opportunities.
- Find eligible river segments suitable for designation as wild, scenic or recreational, if they are important and manageable.
- Make land tenure adjustments which would emphasize enhancement of nontimber uses and values.
- Adopt special timber harvest and forest management practices in rural interface areas zoned for moderate or high density residential occupancy.

Alternative E

Emphasize protection of older forests and management and enhancement of values such as dispersed nonmotorized recreation opportunities and scenic resources.

- Produce a sustained yield of timber consistent with allocations for other uses and values.
- Protect all old growth and older mature forests.
- Protect habitat of all threatened and endangered species, species with high potential for listing and species of related concern.
- Retain all existing research natural areas and areas of critical environmental concern and designate all eligible areas.
- Manage all identified scenic resources and provide some visual resource protection for all lands.
- Manage all riparian areas and wetlands to maintain and improve water quality and fisheries habitat, and contribute to wildlife habitat diversity.
- Emphasize dispersed nonmotorized outdoor recreation opportunities.
- Find all eligible river segments suitable for designation as wild, scenic or recreational rivers.
- Make land tenure adjustments which would emphasize enhancement of nontimber uses and values.
- Adopt special timber harvest and forest management practices extensively buffering rural interface areas zoned for moderate or high density residential occupancy and other rural interface areas as appropriate.

All Common Alternatives

Alternative A

Issue No. 1:
Timber Production Practices

Which forest lands should be available for timber management, and what practices should be used on those lands?

Guidance for All Common Alternatives:

Lands allocated to intensive forest management under any of these alternatives would normally provide the highest nondeclining harvest level (even flow) of timber when the following conditions prevail:

- Effective silvicultural techniques (such as clearcutting, shelterwood or partial cutting) appropriate to the land allocations are used.
- All feasible site preparation and intensive management practices are applied.
- Anticipated merchantability is the only constraint on minimum average stand diameter slated for future harvest. (In some areas this may result in harvest of timber stands as young as 40 years for several decades during the early to middle part of the next century under some alternatives.)
- Adequate budgets are available to support the resultant timber sale program and allied intensive management practices, as well as scheduled monitoring linked to those activities.

The common alternatives assume these practices and conditions on the lands allocated to intensive timber management, but incorporate less intensive management practices on other available forest lands to the extent needed to be consistent with the allocation of those lands.

Where consistent with the goals and objectives of each alternative, the following silvicultural and harvest practices would be implemented on lands allocated primarily to timber management, to meet multiple land use objectives:

Minimize regeneration delay by reforesting harvested sites as soon as practical. Calculate an empirical regeneration period based on representative stocking survey results, expected timber sale contract lengths and management objectives.

Reforest harvested lands with indigenous commercial tree species. Emphasis would be placed on utilization of genetically improved stock in accordance with the Western Oregon Tree Improvement plan.

Manage tree seed orchards to produce adequate supplies of genetically improved seed.

Use available site preparation and seedling protection practices, including herbicides, using an integrated vegetation management approach. Emphasize those techniques that have proved most effective in assuring seedling survival and growth. (Actual practices will be based on site-specific analysis following completion of the resource management plan.)

Allocate all forest lands for timber production consistent with the management direction for other resources (Issue Nos. 2 and 3, etc.) in this alternative, except the following:

- Nonsuitable woodland (see figure D-1 for chart showing Timber Production Capability Classification categories.)

Alternative B

Allocate all forest lands for timber production consistent with the management direction for other resources in this alternative, except the following:

- Nonsuitable woodland
- Suitable woodland - low site

Alternative C

Allocate all forest lands for timber production consistent with the management direction for other resources, except the following:

- Nonsuitable woodland
- Suitable woodland - low site
- Suitable woodland - nonsuitable commercial forest land

Alternative D

Allocate all forest lands for timber production consistent with the management direction for other resources, except the following:

- Nonsuitable woodland
- Suitable woodland - all categories

Alternative E

Allocate all forest lands for timber production consistent with the management direction for other resources, except the following:

- Nonsuitable woodland
- Suitable woodland - all categories
- The fragile gradient-restricted component of the fragile suitable Timber Production Capability Classification category
- Site class V

All Common Alternatives

Alternative A

Issue No. 1 (continued)

Convert to conifers those lands classified as commercial forest lands presently occupied by grass, hardwoods and brush.

Plan hardwood sites for management of a sustained yield of hardwoods, where consistent with allocations for other uses or values.

Implement commercial thinning of present and future stands where practicable and where research indicates increased gains in timber production are likely.

Practice initial spacing control of seedlings/saplings through planting or thinning in conjunction with the control of competing vegetation, to maximize wood production by concentrating site resources in individual tree growth.

Plan nitrogen fertilization applications for all present and future stands where research indicates increased wood yields would result.

Plant specific root disease centers with resistant tree species.

Consider uneven-age management in stands where this method would be economically feasible and would maintain environmental values.

Consider efficiency of field operations and assurance of prompt reforestation in selecting the size of timber harvest units.

Apply proper soil management measures to maintain soil productivity.

Issue Nos. 2 and 3: Old-Growth Forests and Habitat Diversity

To what extent and where should old-growth and/or mature forest habitats be retained, maintained or reestablished to meet various resource objectives? To what extent and where should BLM manage habitat to support populations of native wildlife species?

Any wildlife habitat management practice (such as nest boxes, road closures and forage seeding) not listed in the following could be implemented under any of the alternatives, as long as it is compatible with other management objectives. All special habitat features would be managed to protect their values. Mature and old-growth forests would be retained where congressional designation of areas requires it. Snags and/or wildlife trees (to be converted to snags) would be retained where they occur on lands not allocated to timber harvest, except where public safety is a concern, and if left standing as nonmerchantable material on available forest lands. Where it would contribute to meeting wildlife tree objectives, create snags in areas not allocated primarily to timber production. A habitat goal of timber sale contracts would be to leave all snags and nonmerchantable trees that can be left consistent with safety considerations.

Mature and old-growth forests would be retained on most lands excluded from planned timber harvest by inclusion in the following allocations and Timber Production Capability Classification categories:

- Nonsuitable woodland
- Riparian Management Areas
- Existing high-use recreation sites
- Threatened and endangered species recovery areas where timber harvest is prohibited
- Wilderness areas

Alternative B

Alternative C

Alternative D

Alternative E

Contribute to habitat diversity using a system that protects mature and old-growth forest in large and small blocks. Mature and old-growth components of the forest would be distributed in a corridor system by seed zone and elevation. In the corridor system large blocks of approximately 640 acres would be connected by a series of small, stepping-stone blocks of approximately 80 acres, spaced at about one-mile intervals. Blocks would be limited to defined corridor areas.

Public domain lands and the following allocations and Timber Production Capability Classification categories on Oregon and California and Coos Bay Wagon Road lands would receive priority for placement into the system, to the extent that they fit; for instance, if they provide needed habitat and are suitably located to contribute to the system.

This alternative would provide for retention and improvement of biological diversity. Blocks of forest land at least 600 acres in size and, where relevant opportunities exist, at least 2500 acres in size (including cornering tracts) would be identified as old-growth restoration and retention areas, totalling 15 to 20 percent of BLM-administered forest land. Identification of these areas would focus on protection of older forest stands, connectivity between larger reserves and subregions, and protection of identified areas where special status plant and animal species cluster.

The remaining BLM-administered forest lands, not excluded from timber harvest to address other issues, would be subject to intermediate harvests for density management where feasible, to maintain open canopy conditions and promote retention of mixed species, as well as accelerate development of old-growth structure

This alternative would manage habitats on BLM-administered lands to provide for a number and distribution of spotted owls that ensures continued existence of a well distributed population on those lands, so they may interact with spotted owls throughout the geographic range of the species, as recommended by the Conservation Strategy for the Northern Spotted Owl.

Suitable wildlife trees would be retained to contribute to the maintenance or attainment of cavity-dweller populations on BLM-administered lands at 60 percent of the optimum woodpecker population level. Wildlife tree and down log management practices would be used on the available forest lands, including but not limited to retention of green culls, snags and down logs. All special habitat features would be appropriately buffered.

This alternative would preserve the following:

- All existing forest stands over 150 years old.
- Additional lands within 400 feet of the above stands, to assist in maintaining natural ecological elements, protect the older stands from edge effect and natural disaster, and interconnect them into a sustainable network.
- All suitable habitat forest stands which most closely match the lands within two miles of each spotted owl site occupied by a single or pair of owls in the last six years (1985-1990). In addition protect younger forest where needed to provide contiguous habitat within a mile of those sites.
- In each section where BLM administers at least half of the land, a 40-acre block of the oldest stands remaining, concentrated around headwaters streams, to provide habitat for

All Common Alternatives

Alternative A

Issue Nos. 2 and 3 (continued)

Issue No. 4: Threatened and Endangered (and Other Special Status) Species Habitat

What should BLM do to manage federally listed threatened or endangered plants and animals and to prevent future federal listing of plants and animals as threatened or endangered species?

Protect, monitor, and manage habitats of federally listed and proposed species in accordance with the Endangered Species Act and recovery plans, as legally required for self-sustaining survival.

Timber production constraints would be assumed in the formulation of the alternative only if critical habitat has been designated or there is a recovery or conservation plan within a month after completion of the Analysis of the Management Situation. Manage for the conservation of, and mitigate actions to protect habitats of, federal candidate, state-listed and bureau sensitive species where such actions would not diminish commercial use such as timber production.

Issue No. 5: Special Areas

What areas on BLM-administered lands need special management to prevent irreparable damage to important historic, cultural or scenic values; to protect botanical or fish and wildlife resources or other natural systems or processes; and to protect life and safety from natural hazards? Which of these areas should be formally designated as areas of critical environmental concern?

Any areas considered appropriate for research natural area designation would also be considered appropriate for area of critical environmental concern designation.

Designate potential areas of critical environmental concern that meet criteria only if the relevant values are not protected by other authorities (e.g., wild river designation, the Endangered Species Act). Existing areas of critical environmental concern and potential areas of critical environmental concern that meet the preceding standard, including research natural areas and proposed research natural areas, would be retained or designated on nonforest lands or nonsuitable woodlands of no substantial mineral potential. Other existing areas of critical environmental concern and research natural areas would be revoked.

Alternative B

- Nonsuitable woodland
- Suitable woodland - low site
- Riparian Management Areas
- Recreation sites
- Threatened and endangered species recovery areas where timber harvest is prohibited
- Special areas (natural areas, areas of critical environmental concern)
- Wilderness areas

Suitable wildlife trees and/or snags would be retained to maintain, where possible, cavity-dweller populations at 40 percent of the optimum woodpecker population levels in new timber harvest units. Wildlife tree management practices would be used on the available forest lands, including retention only of green culms and snags.

Same as alternative A, except protect habitats of federal candidate, state-listed and bureau sensitive species to the full extent on public domain lands, and protect habitats of federal candidate (i.e., category 1 and 2) species known only to occur on BLM-administered lands to the extent considered necessary to prevent their federal listing.

Retain all existing areas of critical environmental concern and research natural areas. Designate potential areas of critical environmental concern that meet criteria only if the relevant values are not protected by other authorities. Do not allocate new research natural areas on available Oregon and California or Coos Bay Wagon Road lands if a similar feature can be protected on a national forest. Designate all potential areas of critical environmental concern (including research natural areas) on public domain lands, nonforest lands, nonsuitable woodlands, and other lands allocated to nontimber uses.

Alternative C

conditions and prepare the stands for regeneration harvest in the future. Regeneration harvests on these lands would be either heavy partial cuts (green-tree retention) or group selection cuts, and would not occur until after a stand had established old-growth characteristics.

The lands in old-growth restoration and retention areas, which have not attained old-growth characteristics, would be subject to similar density management, where feasible, until they attain such a condition.

Suitable wildlife trees would be retained to contribute to the maintenance or attainment of cavity-dweller populations on BLM administered lands at 60 percent of the optimum woodpecker population level. Wildlife tree and down log management practices would be used on the available forest lands, including but not limited to retention of green culms, snags and down logs. All special habitat features would be appropriately buffered.

Same as alternative B except for additional protection of special status species provided by criteria for Issues 2 and 3.

Retain all existing areas of critical environmental concern and research natural areas. Designate potential areas of critical environmental concern that meet criteria only if the relevant values are not protected by other authorities.

Alternative D

Manage all BLM-administered lands to support the conservation and protection of all federal candidate, state-listed, and bureau sensitive species and their habitats.

Retain all existing and designate all potential areas of critical environmental concern.

Alternative E

amphibians and nesting for pileated woodpeckers.

In addition to retention of wildlife potential population level on lands allocated to timber management. Wildlife tree and down log management practices would be used on the available forest lands, including but not limited to retention of green culms, snags and down logs. All special habitats would be appropriately buffered.

Same as Alternative D.

Same as Alternative D.

All Common Alternatives

Alternative A

Issue No. 6: Visual Resources

Which, if any, areas of BLM-administered lands should be managed to reduce visual impacts or enhance visual (scenic) quality?

Note: Guidance for Issue 11 (Rural Interface Area Management) also addresses and defines visual resource management for alternatives B, C, D, and E in rural interface areas, except where this Issue 6 guidance sets a higher standard of visual resource management. Guidance for Issue 9A (Wild and Scenic Rivers) establishes criteria that will substantially dictate visual resource management by alternative I in proposed wild and scenic river corridors. See Issue 9A and Issue 11 guidance for details.

Provide visual resource management class I management within existing boundaries designated by Congress for exclusive management. Manage all other available (for timber harvest) forest land under visual resource management class IV management objectives. Manage other lands as inventoried.

Issue Nos. 7 and 8:
Stream / Riparian / Water Quality

Where and how should riparian zones be managed to protect and improve water quality, fisheries, and wildlife habitat? What actions should be undertaken to comply with state water quality standards? What should BLM do to manage for special needs such as municipal and domestic use?

Guidance for All Common Alternatives:

Establish riparian management areas on perennial streams (generally, third order and larger streams), lakes, ponds, and other waters, to meet Oregon Forest Practices Act requirements and Oregon water quality standards. Typical average widths of riparian management areas by alternative are displayed in table D-1. Within those riparian management areas no lands would be considered "available" (to offer timber for sale as part of the allowable sale quantity). Some timber harvest may occur, however, to achieve resource management objectives. These activities may include road construction and yarding corridors across streams and riparian zones to facilitate timber harvest outside the riparian management area.

Logging, road building and site preparation methods would be designed to minimize the number and/or size of mass soil movements and to maintain the integrity of the riparian management areas. Other activities such as mining, recreation and off-highway vehicle use would be regulated to protect water quality. Stream and riparian habitat improvement measures may be taken on any streams to improve water quality, fish habitat and/or wildlife habitat. Activities would be designed to meet Oregon Forest Practices Act requirements and Oregon water quality standards.

Protect wetlands in accordance with Executive Order 11988 and 11990.

Comply with written agreements with public water systems serving municipalities.

Alternative B

Provide visual resource management class I management within existing boundaries designated by Congress for exclusive management. Manage as inventoried all available forest land adjacent to (within one-quarter mile) developed recreation sites, state and federal highways, state scenic waterways, and rivers designated under the federal Wild and Scenic Rivers Act. Manage all other available forest land under visual resource management class IV management objectives. Manage other lands as inventoried.

Alternative C

Same as alternative B, except on available forest land where BLM-administered land makes up more than half of a viewshed, manage lands as inventoried.

Alternative D

Manage all lands as inventoried.

Alternative E

Same as alternative D, except manage as visual resource management Class III all BLM-administered lands inventoried as class IV; and manage as visual resource management class I BLM-administered lands adjacent to (within one-quarter mile) developed recreation sites, state and federal highways, state scenic waterways and rivers designated under the federal Wild and Scenic Rivers act.

Table D-1 Riparian Management Areas

Stream Order	Average Riparian Management Area Width by Alternative ¹ (each side of the stream in feet)				
	A	B	C	D	E
First					50
Second				60	60
Third	75	75	105	140	200
Fourth	75	100	150	200	200
Fifth	75	140	210	280	280
Sixth	75	160	240	320	320
Lakes, ponds and other waters	75	100	150	200	400

¹ Actual riparian management area widths would be determined by on-the-ground riparian vegetation, terrain and stream characteristics, but would be a minimum of 50 feet on all third order and larger streams. First and second order streams would have riparian management areas designated if perennial or if the beneficial uses warrant.

All Common Alternatives

Alternative A

Issue No. 9: Recreation Resources

What areas or sites should be designed and/or managed to protect or enhance a variety of recreational opportunities?

Manage for dispersed recreation activities consistent with managed forest settings, including hunting, fishing, sightseeing, riding/hiking, and rafting. Maintain and manage existing recreation facilities which make available significant dispersed recreation opportunities, including recreation sites, boat ramps, trails, interpretive signs and related improvements. Manage existing special recreation management areas and delineate extensive recreation management areas.

Manage existing high-use recreation sites and trails and expand them where needed. Close low-use recreation sites and trails. Designate lands open to off-highway vehicles and leave roads open to motorized use, except where such designation would conflict with other allocations.

**Issue No. 9A:
Wild and Scenic Rivers**

What, if any, rivers should be found suitable for designation?

Provide interim protection for all river segments determined to be suitable, until congressional action on BLM plan recommendations. Interim protection should be appropriate to the highest category for which the river is determined to be suitable. Manage congressionally designated rivers consistent with their designation.

No rivers found suitable for designation under any classification.

Alternative B

Same as alternative A, except support the State's Regional Economic Development Plan for the geographic area, retain options for new SRIMAs and high value potential recreation sites and trails on public domain lands, maintain and/or improve all existing developed recreation sites, and consider reopening sites closed in recent years.

No rivers found suitable for designation as wild or scenic. River segments eligible for wild, scenic or recreational classification found suitable for designation as recreational, if all of the following circumstances exist:

- no net adverse economic impacts on the local economy.
- river segment possesses at least one outstandingly remarkable value for which it is considered by BLM to be the top river in the State Comprehensive Outdoor Recreation Plan region.
- BLM can effectively manage the outstanding values of the river segment.

Alternative C

Allocate and manage new special recreation management areas. Continue management of all existing recreation sites and trails, and consider reopening sites closed in recent years. Emphasize wildlife viewing, interpretation and related old-growth forest recreation opportunities, both to attract nonlocal visitors and to serve local users. Retain options for future development of high value potential sites, trails and sightseeing opportunities. Impose additional off-highway vehicle limitations or road closures to protect wildlife habitat or old-growth forest recreation opportunities, minimize conflicts with hikers and horseback riders, or meet other resource objectives.

River segments eligible for scenic or recreational river status found suitable for designation consistent with their highest potential classification, and river segments eligible for wild classification found suitable for designation as scenic, if all of the following circumstances exist. If only the economic impact test is not met, find suitable for designation as recreational.

- no net adverse impacts on the local economy.
- river segment possesses at least one outstandingly remarkable value for which it is considered by BLM to be among the top two rivers in the State Comprehensive Outdoor Recreation Plan region.
- BLM can effectively manage the outstanding values of the river segment.

Alternative D

Same as alternative C, except manage for an optimum range of nonmotorized recreation. Retain options for future development of recreation sites and facilities for dispersed recreation opportunities. Retain existing pockets of old-growth forest that are both adjacent to and accessible from existing or potential recreation areas. Prohibit off-highway vehicle and road use as appropriate to improve wildlife habitat or protect the ecosystem.

Eligible river segments found suitable for designation consistent with their highest potential classification if the following circumstances exist.

- river segment possesses at least one outstandingly remarkable value for which it is considered by BLM to be among the top four rivers in the State Comprehensive Outdoor Recreation Plan region.
- BLM can effectively manage the outstanding values of the river segment.

Alternative E

Same as alternative D.

All eligible river segments found suitable for designation consistent with their highest potential classification.

All Common Alternatives

Alternative A

Issue No. 10: Land Tenure

In what areas would BLM-administered lands be sold, exchanged or transferred out of federal ownership under other authorities to improve management efficiency and benefit resource program objectives? In what areas would BLM attempt to acquire lands to improve management efficiency and benefit resource program objectives?

A major lands program effort would use exchanges to consolidate land ownership patterns to benefit one or more of the resources managed, such as timber, watershed, wildlife habitat, recreation, cultural, botanical, and minerals.

Land tenure adjustment would be guided by a three-zone concept utilizing the following standards:

Zone 1 includes areas currently identified as having high public resource values, and other efficiently managed lands. The natural resource values may require protection by federal law, Executive Order or policy.

These lands may have other values or natural systems which merit long term public ownership. They do not meet the criteria for sale under Federal Land Policy and Management Act section 203(a) and would generally be retained in public ownership.

The zone 1 boundaries should be relatively close to or on BLM property lines except where the intent is to show preferred acquisition areas.

Zone 2 includes lands that are suitable for exchange because they form discontinuous ownership patterns, are less efficient to manage than zone 1 lands, and may not be accessible to the general public. Where appropriate opportunities are identified, these BLM-administered lands may be exchanged for other lands in zones 1 or 2, transferred to other public agencies, or given some form of cooperative management. These lands would not be expected to meet the criteria for sale under section 203(a), and would not be identified as suitable for such sale.

Zone 3 includes lands that are scattered and isolated with no known unique natural resource values. Zone 3 lands are available for use in exchanges for private inholdings in zone 1 (high priority) or zone 2 (moderate priority). They are also potentially suitable for disposal through sale under Federal Land Policy and Management Act section 203(a) if important recreation, wildlife, watershed, threatened or endangered species habitat, and/or cultural values are not identified during disposal clearance reviews and no viable exchange proposals for them can be identified. The discussion of zone 3 lands must state which of the disposal criteria in Federal Land Policy and Management Act section 203(a), apply. Zone 3 lands would also be available for transfer to another agency or to local governments, as needed to accommodate community expansion and other public purposes.

Exchanges would be made to acquire lands which would enhance the nondeclining harvest level of the commercial forest land managed by BLM, by improving age class distribution or other harvest level determination factors. Factors to consider include site quality, access to public forest land, logical logging units, and management of public forest land to facilitate timber harvest. No exchanges would be made to acquire lands more valuable for nontimber uses. No commercial timberland would be sold or leased. Leases or conveyance of land in zones 2 and 3 other than commercial timberland would be made under the Recreation and Public Purposes Act to provide appropriate facilities or services.

Alternative B

Exchanges of Oregon and California and Coos Bay Wagon Road lands would be made primarily to acquire lands which would enhance timber management opportunities. Exchanges of public domain lands would be made to benefit one or more of the resources managed, including nontimber values. Sale of Oregon and California and Coos Bay Wagon Road lands other than available commercial forest lands, and of public domain lands, would be made to dispose of lands that meet any of the criteria of Federal Land Policy and Management Act section 203(a). Leases on such lands would be made to accommodate other uses. Leases or conveyances under the Recreation and Public Purposes Act would be made in zones 2 and 3 to provide appropriate facilities or services.

Alternative C

Same as alternative B, except emphasis would also be given to exchanges of Oregon and California and Coos Bay Wagon Road lands that would contribute to conservation of biological diversity.

Alternative D

Land exchanges would be made to benefit one or more of the resources managed. Exchanges involving disposal of timber to acquire lands containing greater nontimber values would be emphasized. Sales of lands other than available commercial forest lands would be made to dispose of lands that meet criteria (1) or (2) of Federal Land Policy and Management Act section 203(a), but sales of land that meet only criterion (3) would not be made. No lands would be leased, except leases and conveyances under the Recreation and Public Purposes Act would be made in zones 2 and 3 to provide facilities or services for the benefit of the public.

Alternative E

Same as alternative D.

All Common Alternatives

Alternative A

**Issue No. 11: Rural Interface
Area Management**

No special management actions except
those that address other issues.

Which BLM-administered lands should be allocated to receive special management practices due to the concerns of residents who live in close proximity? (Rural Interface areas are areas where BLM-administered lands are adjacent to or intermingled with privately owned lands where county zoning has created or allows for creation of lots as small as 1 to 20 acres. In most rural interface areas concerns of the residents are related to forest management practices, visual quality and potential affects on domestic water sources and water supplies.)

Alternative B

On BLM-administered lands within one quarter mile of private lands in identified rural interface areas zoned for 1 to 5-acre lots, customary forest management practices would be altered, where realistically feasible, to mitigate the adjacent neighbors' concerns (i.e., management would look for alternative methods of practicing intensive forest management). Examples of management options include harvest regimes other than clearcutting, hand application rather than aerial application of herbicides and pesticides, inclusion of additional buffers for domestic water sources, and hand piling slash for burning as opposed to broadcast burning. All BLM-administered lands within a quarter mile of designated rural interface areas 1 to 5-acre lots) would be managed for visual resource management class III objectives.

Alternative C

Same as alternative B except that lands zoned for 1 to 20-acre lots would also be included as the rural interface area.

Alternative D

On BLM-administered lands within one quarter mile of private lands in rural interface areas zoned for 1 to 20-acre lots, there would be no herbicide spraying, no clear cutting, and no prescribed burning. BLM-administered lands within this area would be managed for visual resource management class II objectives.

Alternative E

Same as alternative D except BLM-administered lands within one-half mile of private lands in rural interface areas would be managed as discussed in alternative D. Areas zoned for lots larger than 20 acres, but with tax lots of 20 acres or less and/or existing legal multiple residences, may also be addressed in this alternative.

Revised February 4, 1992

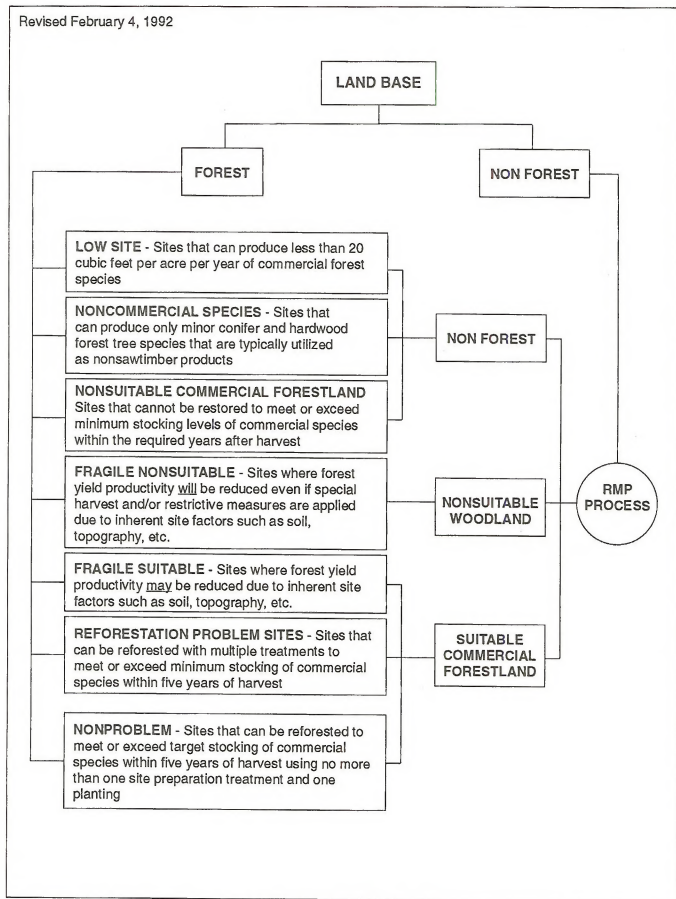


Figure D-1 Timber Production Capability Classification Categories

Revised February 4, 1992

Sensitivity Analyses

Sensitivity analysis is a process of examining specific opportunity costs and trade-offs which would result from making changes in single sensitive elements of an alternative. Such analyses are helpful in developing the preferred alternative, to make it most effective in reconciling potential conflicts and optimizing overall benefits. The sensitivity analysis will have the further benefit of informing the public about certain trade-offs, which should facilitate their offering informed preferences in their comments on the draft resource management plan/environmental impact statement.

Because of the number of issues, concerns and alternatives, sensitivity analysis must be tightly focused to be manageable. The analysis, therefore, will focus on mid-range common alternatives and the preferred alternative.

At a minimum, the following will be analyzed for effects on timber harvest (allowable sale quantity) and related jobs and county revenues, and on other relevant resources or values:

1. For alternatives B, C, and D, effects of substituting the next higher and next lower common alternative levels of riparian zone protection, and of providing only legally required (alternative A) protection of riparian zones to preserve commercial trees on suitable forest or woodland. For the preferred alternative, the effects of substituting the alternative A and E levels.
2. For alternative B, the effects of allocating no lands specifically for maintenance of older forest stands; or of managing the lands allocated for such protection on 250-year or longer rotation, with explicit provision for replacement; or of managing the lands allocated for timber production on 150-year rotation.
3. For alternatives B and C, the effects of managing all lands allocated for timber production entirely under either of alternative C's partial retention approaches.
4. For alternative C, the effects of managing the lands allocated for timber production entirely for 15 to 20 percent partial retention, but in the first decades not harvesting in the oldest 20 percent of them.
5. For alternatives B and D, the effects of substituting the U.S. Fish and Wildlife Service proposed spotted owl recovery plan for each alternative's older forest or spotted owl protection approach. For the preferred alternative, to provide a similar analysis, the effects of substituting the 50-11-40 rule for provision of connectivity by special management in Connectivity Areas.
6. For alternative C, the effects of allocating the restoration and retention blocks to more than 35 percent partial retention management, or of accelerating density management in those blocks in the first decade to the extent practical.
7. For alternative D, the effects of a minimum harvest age constraint of 60 years (vis-a-vis 40 years in alternative D in many plans).
8. For the preferred alternative:
 - The effects of precluding all timber harvest in old growth ecosystem areas.
 - No regeneration harvest of stands younger than cumulation of mean annual increment.
 - No constraint on minimum age of stands subject to regeneration harvest in General Forest Management Areas.
 - Foregoing planting genetically-selected stock, vegetation management for release and precommercial thinning, fertilization, and stand conversion. To be analyzed for each practice individually and for all combined.

Other sensitivity analysis elements or increments may be added as deemed appropriate by a district.

Estimated effects on allowable sale quantity, together with resulting local employment and county revenues for each analysis, will be quantified. Effects on other resource attributes will be quantified only where available analytical techniques are readily applicable. Otherwise, effects will be compared to relevant environmental consequence conclusions for the basic plan alternatives.

Appendix E

Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl

Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl

This appendix consists of the record of decision and its appendix A, published in April 1994, for the *Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*. It is referred to in this proposed resource management plan/final environmental impact statement as the SEIS record of decision.

The SEIS record of decision is bound separately from the proposed resource management plan/final environmental impact statement and is incorporated by reference. The Draft and Final SEIS and the SEIS record of decision were sent to those who received copies of the Draft Salem District Resource Management Plan and Environmental Impact Statement. It was also sent to agencies, libraries, and others who requested it. It is available upon request.

To obtain a copy of the record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl, send a request in writing to:

Regional Ecosystem Office
P.O. Box 3623
Portland, Oregon 97208-3623

Appendix F

Management for SEIS Special Attention Species

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
Fungi					
Mycorrhizal Fungi					
Boletes					
<i>Gastroboletus subalpinus</i>	X		X		
<i>Gastroboletus turbinatus</i>			X		
Boletes, low elevation					
<i>Boletus piperatus</i>			X		
<i>Tylopilus pseudoscaber</i>	X		X		
Rare Boletes					
<i>Boletus haematinus</i>	X		X		
<i>Boletus pulcherrimus</i>	X		X		
<i>Gastroboletus imbellus</i>	X		X		
<i>Gastroboletus ruber</i>	X		X		
False Truffles					
<i>Nivatogastrium nubigenum</i>	X		X		
<i>Rhizopogon abietis</i>			X		
<i>Rhizopogon atroviolaceus</i>			X		
<i>Rhizopogon truncatus</i>			X		
<i>Thaxterogaster pingue</i>			X		
Uncommon False Truffle					
<i>Macowanites chlorinosmus</i>	X		X		
Rare False Truffles					
<i>Alpova alexsmithii</i>	X		X		
<i>Alpova olivaceotinctus</i>	X		X		
<i>Arcangeliella crassa</i>	X		X		
<i>Arcangeliella lactarioides</i>	X		X		
<i>Destuntzia fusca</i>	X		X		
<i>Destuntzia rubra</i>	X		X		
<i>Gautieria magnicellaris</i>	X		X		
<i>Gautieria otthii</i>	X		X		
<i>Leucogaster citrinus*</i>	X		X		
<i>Leucogaster microsporus</i>	X		X		
<i>Macowanites lymanensis</i>	X		X		
<i>Macowanites mollis</i>	X		X		
<i>Martellia fragrans</i>	X		X		
<i>Martellia idahoensis</i>	X		X		
<i>Martellia monticola</i>	X		X		
<i>Octavianina macrospora</i>	X		X		

* Species known to occur on BLM-administered lands in the Salem District.

Species with definitive information that they do not occur on the Salem District have been removed from the list.

¹ Survey Strategies: 1 = manage known sites; 2 = survey prior to activities and manage sites; 3 = conduct extensive surveys and manage sites; 4 = conduct general regional surveys.

² Protection Buffers are additional standards and guidelines from the Scientific Analysis Team Report for specific rare and locally endemic species, and other specific species in the upland forest matrix (see SEIS record of decision, page C-19).

Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Octavianina papyracea</i>	X		X		
<i>Rhizopogon brunneiniger</i>	X		X		
<i>Rhizopogon evadens</i> var. <i>subalpinus</i>	X		X		
<i>Rhizopogon exiguus</i>	X		X		
<i>Rhizopogon flavofibrillosus</i>	X		X		
<i>Rhizopogon inquinatus</i>	X		X		
<i>Sedecula pulvinata</i>	X		X		
Undescribed Taxa, Rare Truffles and False Truffles					
<i>Alpova</i> sp. nov. #Trappe 9730	X		X		
<i>Alpova</i> sp. nov. #Trappe 1966	X		X		
<i>Arcangeliella</i> sp. nov. #Trappe 12382	X		X		
<i>Arcangeliella</i> sp. nov. #Trappe 12359	X		X		
<i>Chamonixia pacifica</i> sp. nov. #Trappe 12768	X		X		
<i>Elaphomyces</i> sp. nov. #Trappe 1038	X		X		
<i>Gastroboletus</i> sp. nov. #Trappe 2897	X		X		
<i>Gastroboletus</i> sp. nov. #Trappe 7515	X		X		
<i>Gastrosuillus</i> sp. nov. #Trappe 7516	X		X		
<i>Gastrosuillus</i> sp. nov. #Trappe 9608	X		X		
<i>Gymnomyces</i> sp. nov. #Trappe 4703,5576	X		X		
<i>Gymnomyces</i> sp. nov. #Trappe 5052	X		X		
<i>Gymnomyces</i> sp. nov. #Trappe 1690,1706,1710	X		X		
<i>Gymnomyces</i> sp. nov. #Trappe 7545	X		X		
<i>Hydnotrya</i> sp. nov. #Trappe 787,792	X		X		
<i>Hydnotrya subnix</i> sp. nov. #Trappe 1861	X		X		
<i>Martellia</i> sp. nov. #Trappe 649	X		X		
<i>Martellia</i> sp. nov. #Trappe 1700	X		X		
<i>Martellia</i> sp. nov. #Trappe 311	X		X		
<i>Martellia</i> sp. nov. #Trappe 5903	X		X		
<i>Octavianina</i> sp. nov. #Trappe 7502	X		X		
<i>Rhizopogon</i> sp. nov. #Trappe 9432	X		X		
<i>Rhizopogon</i> sp. nov. #Trappe 1692	X		X		
<i>Rhizopogon</i> sp. nov. #Trappe 1698	X		X		
<i>Thaxterogaster</i> sp. nov. #Trappe 4867,6242,7427,7962,8520	X		X		
<i>Tuber</i> sp. nov. #Trappe 2302	X		X		
<i>Tuber</i> sp. nov. #Trappe 12493	X		X		

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
Rare Truffles					
<i>Balsamia nigra</i>	X		X		
<i>Choiromyces alveolatus</i>	X		X		
<i>Choiromyces venosus</i>	X		X		
<i>Elaphomyces anthracinus</i>	X		X		
<i>Elaphomyces subviscidus</i>	X		X		
Chanterelles					
<i>Cantharellus cibarius</i> *			X	X	
<i>Cantharellus subalbidus</i> *			X	X	
<i>Cantharellus tubaeformis</i>			X	X	
Chanterelles - Gomphus					
<i>Gomphus bonarii</i>			X		
<i>Gomphus clavatus</i> *			X		
<i>Gomphus floccosus</i> *			X		
<i>Gomphus kauffmanii</i>			X		
Rare Chanterelle					
<i>Cantharellus formosus</i>	X		X		
<i>Polyozellus multiplex</i>	X		X		X
Uncommon Coral Fungi					
<i>Ramaria abietina</i>			X		
<i>Ramaria aralospora</i>	X		X		
<i>Ramaria botrytis</i> var. <i>aurantiiramosa</i>	X		X		
<i>Ramaria concolor</i> f. <i>tsugina</i>			X		
<i>Ramaria coulterae</i>			X		
<i>Ramaria fasciculata</i> var. <i>sparsiramosa</i>	X		X		
<i>Ramaria gelatinisaurantia</i>	X		X		
<i>Ramaria largentii</i>	X		X		
<i>Ramaria rubella</i> var. <i>blanda</i>	X		X		
<i>Ramaria rubrievanescens</i>	X		X		
<i>Ramaria rubripermanens</i>	X		X		
<i>Ramaria suecica</i>			X		
<i>Ramaria thiersii</i>	X		X		
Rare Coral Fungi					
<i>Ramaria amyloidea</i>	X		X		
<i>Ramaria aurantiiscescens</i>	X		X		
<i>Ramaria celerivirescens</i>	X		X		

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Ramaria claviramulata</i>	X		X		
<i>Ramaria concolor</i> f. <i>marri</i>	X		X		
<i>Ramaria cyaneigranosa</i>	X		X		
<i>Ramaria hilaris</i> var. <i>olympiana</i>	X		X		
<i>Ramaria lorthamnus</i>	X		X		
<i>Ramaria maculatipes</i>	X		X		
<i>Ramaria rainierensis</i>	X		X		
<i>Ramaria rubribrunnescens</i>	X		X		
<i>Ramaria stuntzii</i>	X		X		
<i>Ramaria vertotensis</i>	X		X		
<i>Ramaria gracilis</i>	X		X		
<i>Ramaria spinulosa</i>	X		X		
Phaeocollybia					
<i>Phaeocollybia attenuata</i>			X		
<i>Phaeocollybia californica</i>	X		X		
<i>Phaeocollybia carmanahensis</i>	X		X		
<i>Phaeocollybia dissiliens</i>	X		X		
<i>Phaeocollybia fallax</i>			X		
<i>Phaeocollybia gregaria</i>	X		X		
<i>Phaeocollybia kauffmanii</i>	X		X		
<i>Phaeocollybia olivacea</i>			X		
<i>Phaeocollybia oregonensis</i>	X		X		
<i>Phaeocollybia piceae</i>	X		X		
<i>Phaeocollybia pseudofestiva</i>			X		
<i>Phaeocollybia scatesiae</i>	X		X		
<i>Phaeocollybia sipel</i>	X		X		
<i>Phaeocollybia spadicea</i>			X		
Uncommon Gilled Mushrooms					
<i>Catathelasma ventricosa</i>			X		
<i>Cortinarius azureus</i>			X		
<i>Cortinarius boulderensis</i>	X		X		
<i>Cortinarius cyanites</i>			X		
<i>Cortinarius magnivelatus</i>	X		X		
<i>Cortinarius olympianus</i>	X		X		
<i>Cortinarius spilomius</i>			X		
<i>Cortinarius tabularis</i>			X		
<i>Cortinarius valgis</i>			X		
<i>Dermocybe humboldtensis</i>	X		X		

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Habeloma olympiana</i>	X		X		
<i>Hygrophorus caeruleus</i>	X		X		
<i>Hygrophorus karstenii</i>			X		
<i>Hygrophorus vernalis</i>	X		X		
<i>Russula mustelina</i>			X		
Rare Gilled Mushrooms					
<i>Chroogomphus loculatus</i>	X		X		
<i>Cortinarius canabarpa</i>	X		X		
<i>Cortinarius rainierensis</i>	X		X		
<i>Cortinarius varipes</i>	X		X		
<i>Cortinarius verrucisporus</i>	X		X		
<i>Cortinarius wiebeae</i>	X		X		
<i>Tricholoma venenatum</i>	X		X		
Uncommon Ecto-Polypores					
<i>Albatrellus ellisii</i>			X		
<i>Albatrellus flettii</i>			X		
Rare Ecto-Polypores					
<i>Albatrellus avellaneus</i>	X		X		
<i>Albatrellus caeruleoporus</i>	X		X		
Tooth Fungi					
<i>Hydnum repandum</i> *			X		
<i>Hydnum umbilicatum</i>			X		
<i>Phellodon atratum</i>			X		
<i>Sarcodon fuscoindicum</i>			X		
<i>Sarcodon imbricatus</i>			X		
Rare Zygomycetes					
<i>Endogone arcogena</i>	X		X		
<i>Endogone oregonensis</i>	X		X		
<i>Glomus radiatum</i>	X		X		
Saprobies (Decomposers)					
Uncommon Gilled Mushrooms					
<i>Baeospora myriadophylla</i>			X		
<i>Chrysomphalina grossula</i>			X		
<i>Collybia bakerensis</i>	X		X		
<i>Fayodia gracilipes (rainierensis)</i>			X		
<i>Gymnopilus punctifolius</i>	X		X		

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Marasmius applanatus</i>	X		X		
<i>Mycena hudsoniana</i>	X		X		
<i>Mycena lilacifolia</i>			X		
<i>Mycena marginella</i>			X		
<i>Mycena monticola</i>	X		X		
<i>Mycena overholtsii</i>	X		X		
<i>Mycena quinaultensis</i>	X		X		
<i>Mycena tenax</i>			X		
<i>Mythicomycetes comeipes</i>			X		
<i>Neolentinus kauffmanii</i>	X		X		
<i>Pholiota albivellata</i>	X		X		
<i>Stagnicola perplexa</i>			X		
Rare Gilled Mushrooms					
<i>Clitocybe subditopoda</i>	X		X		
<i>Clitocybe senilis</i>	X		X		
<i>Neolentinus adherens</i>	X		X		
<i>Rhodocybe nitida</i>	X		X		
<i>Rhodocybe speciosa</i>	X		X		
<i>Tricholomopsis fulvescens</i>	X		X		
Noble Polypore (rare and endangered)					
<i>Oxyporus nobilissimus*</i>	X	X	X		
Bondarzewia Polypore					
<i>Bondarzewia montana</i>	X	X	X		
Rare Resupinates and Polypores					
<i>Aleurodiscus farlowii</i>	X		X		
<i>Dichostereum granulatum</i>	X		X		
<i>Cudonia monticola</i>			X		
<i>Gyromitra californica</i>			X	X	
<i>Gyromitra esculenta*</i>			X	X	
<i>Gyromitra infusa</i>			X	X	
<i>Gyromitra melaleucoides</i>			X	X	
<i>Gyromitra montana</i> (syn. <i>G. gigas</i>)			X	X	
<i>Otidea leporina</i>			X		X
<i>Otidea onotica</i>			X		
<i>Otidea smithii</i>	X		X		X
<i>Plectania melastoma</i>			X		
<i>Podostroma alutaceum</i>			X		
<i>Sarcosoma mexicana*</i>			X		X

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Sarcosphaera eximia</i>			X		
<i>Spathularia flavida</i>			X		
Rare Cup Fungi					
<i>Aleuria rhenana</i>					X
<i>Bryoglossum gracile</i>					
<i>Gelatinodiscus flavidus</i>	X		X		
<i>Helvella compressa</i>	X		X		
<i>Helvella crassitunicata</i>	X		X		
<i>Helvella elastica</i>	X		X		
<i>Helvella maculata</i>	X		X		
<i>Neomula pouchetii</i>	X		X		
<i>Pithya vulgaris</i>	X		X		
<i>Plectania latahensis</i>	X		X		
<i>Plectania milleri</i>	X		X		
<i>Pseudaleuria quinautiana</i>	X		X		
Club Coral Fungi					
<i>Clavariadelphus ligula</i>			X	X	
<i>Clavariadelphus pistillaris</i>			X	X	
<i>Clavariadelphus truncatus</i>			X	X	
<i>Clavariadelphus borealis</i>			X	X	
<i>Clavariadelphus lovejoyae</i>			X	X	
<i>Clavariadelphus sachalinensis</i>			X	X	
<i>Clavariadelphus subfastigiatus</i>			X	X	
Jelly Mushroom					
<i>Phlogitis helvelloides</i>			X	X	
Branched Coral Fungi					
<i>Clavulina cinerea</i>			X	X	
<i>Clavulina cristata</i>			X	X	
<i>Clavulina ornaticipes</i>			X	X	
Mushroom Lichen					
<i>Phytoconis ericetorum</i>			X	X	
Parasitic Fungi					
<i>Asterophora lycoperdoides</i>			X		
<i>Asterophora parasitica</i>			X		
<i>Collybia racemosa</i>			X		
<i>Cordyceps capitata</i>			X		

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Cordyceps ophioglossoides</i>			X		
<i>Hypomyces luteovirens</i>			X		
Cauliflower Mushroom					
<i>Sparassis crispa</i> *			X		
Moss Dwelling Mushrooms					
<i>Cyphellostereum laeve</i>			X		
<i>Galerina atkinsoniana</i>			X		
<i>Galerina cerina</i>			X		
<i>Galerina heterocystis</i>			X		
<i>Galerina sphagnicola</i>			X		
<i>Galerina vittaeformis</i>			X		
<i>Rickenella setipes</i>			X		
Coral Fungi					
<i>Clavicornia avellanea</i>			X		
Lichens					
Rare Forage Lichen					
<i>Bryoria tortuosa</i>	X		X		
Rare Leafy (arboreal) Lichens					
<i>Hypogymnia duplicata</i>	X	X	X		
<i>Tholurna dissimilis</i>	X		X		
Rare Nitrogen-fixing Lichens					
<i>Dendroscopaulon intricatulum</i>	X		X		
<i>Lobaria hallii</i>	X		X		
<i>Lobaria linita</i> *	X	X	X		
<i>Nephroma occulturn</i>	X		X		
<i>Pannaria rubiginosa</i> *	X		X		
<i>Pseudocyphellaria rainierensis</i> *	X	X	X		
Nitrogen-fixing Lichens					
<i>Lobaria oregana</i> *				X	
<i>Lobaria pulmonaria</i> *				X	
<i>Lobaria scrobiculata</i> *				X	
<i>Nephroma bellum</i> *				X	
<i>Nephroma helveticum</i> *				X	
<i>Nephroma laevigatum</i> *				X	

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Nephroma parile</i>					X
<i>Nephroma resupinatum</i> *					X
<i>Pannaria leucostictoides</i>					X
<i>Pannaria mediterranea</i>					X
<i>Pannaria saubinetii</i> *					X
<i>Peltigera collina</i> *					X
<i>Peltigera neckeri</i>					X
<i>Peltigera pacifica</i>					X
<i>Pseudocyphellaria anomala</i> *					X
<i>Pseudocyphellaria anthraspis</i> *					X
<i>Pseudocyphellaria crocata</i> *					X
<i>Sticta beauvoisii</i>					X
<i>Sticta fuliginosa</i> *					X
<i>Sticta limbata</i> *					X
Pin Lichens					
<i>Calicium abietinum</i>					X
<i>Calicium adaequatum</i>					X
<i>Calicium adpersum</i>					X
<i>Calicium glaucellum</i>					X
<i>Calicium viride</i>					X
<i>Chaenotheca brunneola</i>					X
<i>Chaenotheca chrysocephala</i> *					X
<i>Chaenotheca ferruginea</i>					X
<i>Chaenotheca furfuracea</i>					X
<i>Chaenotheca subroscida</i>					X
<i>Chaenothecopsis pusilla</i>					X
<i>Cyphellium inquinans</i>					X
<i>Microcalicium arenarium</i>					X
<i>Mycocalicium subtile</i> *					X
<i>Stenocybe clavata</i>					X
<i>Stenocybe major</i>					X
Rare Rock Lichens					
<i>Pilophorus nigricaulis</i> *	X		X		
<i>Sticta arctica</i>	X		X		
Riparian Lichens					
<i>Cetrelia cetrarioides</i> *					X
<i>Collema nigrescens</i>					X

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Leptogium burnetiae</i> var. <i>hirsutum</i>				X	
<i>Leptogium cyanescens</i>				X	
<i>Leptogium saturninum</i>				X	
<i>Leptogium teretiusculum</i>				X	
<i>Platismatia lacunosa</i> *				X	
<i>Ramalina thrausta</i> *				X	
<i>Usnea longissima</i> *				X	
Aquatic Lichens					
<i>Dermatocarpon luridum</i>	X		X		
<i>Hydrothyria venosa</i>	X		X		
<i>Leptogium rivale</i>	X		X		
Rare Oceanic Influenced Lichens					
<i>Bryoria pseudocapillaris</i>	X		X		
<i>Bryoria spirallifera</i>	X		X		
<i>Bryoria subcana</i>	X		X		
<i>Buellia oidealea</i>	X		X		
<i>Erioderma sorediatum</i>	X		X		
<i>Hypogymnia oceanica</i>	X		X		
<i>Leioderma sorediatum</i>	X		X		
<i>Leptogium brebissonii</i>	X		X		
<i>Niebla cephalota</i>	X		X		
<i>Pseudocyphellaria mougeotiana</i>	X		X		
<i>Teloschistes flavicans</i>	X		X		
<i>Usnea hesperina</i>	X		X		
Oceanic Influenced Lichens					
<i>Cetraria californica</i>	X		X		
<i>Heterodermia leucomelos</i>	X		X		
<i>Loxospora</i> sp. nov. " <i>corallifera</i> " (<i>Brodo in edit</i>)	X		X		
<i>Pyrrospora quemea</i>	X		X		
Additional Lichen Species					
<i>Cladonia norvegica</i>			X		
<i>Heterodermia sitchensis</i>			X		
<i>Hypogymnia vittata</i>			X		
<i>Hypotrachyna revoluta</i>			X		
<i>Ramalina pollinaria</i>			X		
<i>Nephroma isidiosum</i>			X		

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
Bryophytes					
<i>Antitrichia curtipendula</i>				X	
<i>Bartramioopsis lescurei</i>	X		X		
<i>Brotherella roelli</i>	X		X		
<i>Buxbaumia piperi</i> *					X
<i>Diplophyllum albicans</i>	X		X		
<i>Diplophyllum plicatum</i>	X	X			
<i>Douinia ovata</i> *				X	
<i>Encalypta brevicollis</i> var. <i>crumiana</i>	X		X		
<i>Herbertus aduncus</i>	X		X		
<i>Herbertus sakuraii</i>	X		X		
<i>Iwatsukiella leucotricha</i>	X		X		
<i>Kurzia makinoana</i>	X	X			
<i>Marsupella emarginata</i> var. <i>aquatica</i>	X	X			
<i>Orthodontium gracile</i>	X		X		
<i>Plagiochila satol</i>	X		X		
<i>Plagiochila semidecurrens</i>	X		X		
<i>Pleuroziopsis ruthenica</i>	X		X		
<i>Ptilidium californicum</i>	X	X			X
<i>Racomitrium aquaticum</i>	X		X		
<i>Radula brunnea</i>	X		X		
<i>Rhizomnium nudum</i>					X
<i>Scouleria marginata</i>				X	
<i>Tetraphis geniculata</i>	X		X		X
<i>Tritomaria exsectiformis</i>	X	X			
<i>Tritomaria quinqueidentata</i>	X		X		
Amphibians					
Larch Mountain salamander		X			
Mammals					
Red tree vole (<i>P. longicaudus</i>)*		X			
Mollusks					
<i>Cryptomastix devia</i>	X	X			
<i>Cryptomastix hendersoni</i>	X	X			
<i>Monadenia fidelis minor</i>	X	X			
<i>Trilobopsis tehamana</i>	X	X			
<i>Deroceras hesperium</i>	X	X			
<i>Hemphillia malonei</i>	X	X			

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Management for SEIS Special Attention Species (continued)

Species	Survey Strategies ¹				Protection Buffers ²
	1	2	3	4	
<i>Prophysaon coeruleum</i>	X	X			
<i>Prophysaon dubium</i>	X	X			
<i>Juga (O.) n. sp. 2</i>	X	X			
Vascular Plants					
<i>Allotropa virgata</i> *	X	X			
<i>Arceuthobium tsugense</i> *	X	X			
<i>Aster vialis</i>	X	X			
<i>Botrychium minganense</i>	X	X			
<i>Botrychium montanum</i>	X	X			
<i>Coptis asplenifolia</i>	X	X			
<i>Coptis trifolia</i>	X	X			
<i>Corydalis aqua-gelidae</i> *	X	X			
<i>Cypripedium montanum</i> (west Cascades)	X	X			
Arthropods					
Understory and forest gap herbivores				X	
Birds					
Black-backed woodpecker*					X
Great gray owl					X

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Appendix G Best Management Practices

(first section)

Timber Production Capability Classification Fragile Code Guidance

(second section)

Best Management Practices

The best management practices described in this document are intended to maintain or improve water quality and soil productivity, and prevent or mitigate adverse impacts while meeting other resource objectives. The best management practices are designed to provide compliance with the Clean Water Act of 1972, as amended in 1977 and 1987.

For proposed management actions, best management practices designed and implemented in accordance with a state approved process will normally constitute compliance with the Clean Water Act. The set of procedures prescribed by Oregon Forest Practice Act is the standard by which all forestry best management practices in Oregon are measured. The best management practices employed by BLM often are different in detail from the Oregon Forest Practice Act but must be equal or more protective of resources in terms of end results.

The iterative process by which nonpoint controls including best management practices are to be selected and implemented to achieve water quality standards include: (1) design of best management practices based upon site specific conditions, technical, economic and institutional feasibility, and the water quality of those waters potentially impacted; (2) monitoring to ensure that practices are properly designed and applied; (3) monitoring to determine: a) the effectiveness of practices in meeting water quality standards, and b) the appropriateness of water quality criteria in reasonably assuring protection of beneficial uses; and (4) adjustment of best management practices when it is found that water quality standards are not being protected to a desired level and/or possible adjustment of water quality standards based upon considerations in 40 Code of Federal Regulations 131.

Best management practices would be developed on a site specific basis and consists of a mix of conservation practices such as those listed below and management guidance identified in chapter 2.

I. Timber Harvest

A. Cable Yarding

1. On areas with high water tables, yard with full suspension or with one-end suspension on seasonally dry soils.
2. On areas with slopes exceeding 65 percent, yard with full suspension, one-end suspension using seasonal restrictions, or one-end suspension using a standing skyline with lateral yarding capacity. Yard remaining areas using one-end suspension.
3. Pile yarding debris on the landing to minimize the acreage around the landing impacted by intense burns or obstructed by heavy slash concentrations.
4. Hand water bar cable yarding corridors immediately after use on sensitive soils where gouging occurs.
5. When absolutely necessary to yard through riparian areas, restrict yarding in riparian areas to corridors that are perpendicular to streams. Management guidelines for corridors are:
 - a. Restrict corridors to the minimum number feasible.

- b. Corridors will not exceed 50 feet in width nor reduce crown cover on a project stream segment to less than 75 percent of predisturbance conditions.
- c. Logs will be fully suspended over water and adjacent banks.

B. Ground-Based Yarding

1. Use existing skid roads wherever possible.
2. Limit new skid roads to slopes less than 35 percent.
3. Use designated skid roads to limit areal extent of skid roads plus landings to less than 10 percent of the unit.
4. Restrict tractor operations to designated roads and limit operations to periods of low soil moisture, when soils have the most resistance to compaction (dry season).
5. In partial cut areas, locate skid roads where they can be used for regeneration harvest.
6. Till compacted roads, including skid roads from previous entries, with a properly designed self-drafting winged subsoiler.
7. Avoid tractor yarding on areas where soil damage cannot be mitigated.
8. Avoid placement of skid roads through areas of high water tables or where the skid roads would channel water into unstable headwall areas.
9. Water bar skid roads whenever surface erosion is likely.
10. Avoid use of wide track vehicles or more than one machine on a skid road at any given time to minimize the width of the skidroads. On multiple pass skid roads, wide track vehicles create in wider skid roads, and after multiple passes, drive the compaction deeper than a regular width track. However, they are good for one pass operations such as incidental scattered salvage or site preparation.
11. If timber harvesting activities will produce slash that covers the existing skid roads so they cannot be relocated, till prior to felling timber with a properly designed winged subsoiler.

C. Aerial Yarding

1. Use helicopter, balloon, or skyline yarding to avoid or minimize new road construction, or to provide complete suspension in sensitive watersheds.
2. Place landings away from watercourses to prevent petroleum products or other pollutants from entering the water.

II. Roads

A. Location

1. Locate roads on stable positions (e.g., ridges, natural benches, and flatter transitional slopes near ridges and valley bottoms). Implement extra mitigation measures when crossing unstable areas is unavoidable.
2. Avoid headwalls whenever possible.
3. Locate roads to minimize heights of cuts. Avoid high, steeply sloping cuts in highly fractured bedrock or deep soil.
4. Avoid wet areas by rolling the grade.
5. Avoid locating roads through areas where the geologic bedding planes or weathering surfaces are inclined with the slope.
6. Locate stream crossing sites where channels are well defined, unobstructed, and straight.

B. General Road Design Features

1. Design standards and criteria are based on road management objectives such as traffic requirements of the project and the overall transportation plan, an economic analysis, safety requirements, resource objectives, and the minimization of damage to the environment.
2. Consider future maintenance concerns and needs when designing roads.
3. Preferred road gradients are 2 to 10 percent with a maximum sustained grade of 15 percent. Use steeper grades in those situations where they will result in less environmental impact. Avoid grades less than two percent.
4. Outsloping of the road prism for surface drainage is normally recommended for local spurs or minor collector roads where low volume traffic and lower traffic speeds are anticipated. It is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is desired. Outsloping is not recommended on sustained gradients over 8-10 percent.
5. Insloping of the road prism is an acceptable practice on roads with gradients over 10 percent and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.
6. The traditional "crown" and "ditch" configuration is recommended for arterial and collector roads where traffic volume, speed, intensity and user comfort are a consideration. Gradients may range from 2 to 15 percent so long as adequate drainage away from the road surface and ditchlines is maintained.
7. Minimize excavation.
8. Locate stable waste disposal areas suitable for depositing excess excavated material.
9. Endhaul waste materials generated during road and ditch maintenance if side slopes exceed 60 percent or where unacceptable environmental damage may occur if sidecasting is used.
10. Where slopes have been overloaded, endhaul sidecast materials.
11. Provide for vegetative or artificial stabilization of cut and fill slopes in the design process.
12. Prior to completion of design drawings, field check the design to ensure that it fits the terrain, drainage needs have been satisfied, and all critical slope conditions have been satisfied.
13. Do not divert water directly into headwalls. Vary the grade or install cross drains to channel water away from headwalls. Check maintenance on existing roads to ensure water is not allowed to remain on the road and/or diverted into unstable headwall areas.
14. Unless a road is needed for future entry, use a temporary road and reclaim it after use, using methods such as blocking, ripping seeding, mulching, fertilizing, and water barring.
15. Minimize potential erosion on a road. If it is dirt surface, reclaim it; otherwise apply rock aggregate to minimize surface erosion.
16. Select landing locations on the basis of minimal excavation, erosion potential, or slope stability concerns.
17. Avoid landing locations alongside or in meadows, wetland areas, or other special habitat features.
18. Shape landings to direct surface water runoff to preselected spots where it can be dispersed to natural, well-vegetated, stable ground.

C. Design of Cross Drains

1. Design placement of all cross drains to avoid discharge onto erodible (unprotected) slopes or directly into stream channels. Provide a buffer or sediment basin between the cross drain outlet and the stream channel.
2. Locate culverts or drainage dips to avoid outflows onto unstable terrain such as headwalls, landslide features or block failure zones. Provide adequate spacing to avoid accumulation of water in ditches or surfaces through these areas.
3. Provide energy dissipators or armoring at cross drain outlets or drain dips where water is discharged onto loose material, erodible soil, or steep slopes.

4. Locate drainage dips where water might accumulate, or where there is an outside berm that prevents drainage from the roadway.
5. Use drainage dips and/or lead-off ditches in lieu of culverts on roads which have gradients less than 10 percent or where road management objectives result in blocking roads. Avoid drainage dips on road gradients over 10 percent.
6. Cut all cannon culverts to the proper length, downspout, and provide for energy dissipation if needed.
7. Design cross drainage culverts or drainage dips immediately upgrade of stream crossings to prevent ditch sediment from entering the stream.
8. Vary road gradients in erodible and unstable soils to reduce surface water volume and velocities, and the necessity for culverts.
9. Use slotted riser inlets in areas with highly erosive soils to prevent culvert plugging.

D. Design of Stream Crossings

1. Pipe arch culverts are appropriate on most fishery streams. Bottomless arch culverts and bridges will be necessary in some instances where gradients greater than five percent, stream discharge, and value of the fishery resource dictate that special engineering considerations are necessary to ensure uninterrupted fish passage. A round culvert may be suitable on streams where fish passage is not a concern.
2. Use the theoretical 100-year flood as design criteria for pipe arches or culverts.
3. Minimize the number of crossings on any particular stream.
4. Where feasible, design culvert placement on a straight reach of stream to minimize erosion at both ends of the culvert. Design adequate stream bank protection (e.g., riprap) where scouring could occur. Avoid locations requiring that the stream channel be straightened beyond the length of a culvert to facilitate installation of a road crossing.
5. Evaluate the advantages and disadvantages of a temporary versus permanent crossing structure. This evaluation should take into account economics, maintenance, and resource requirements for access to the area during all seasons over the longterm.
6. Reconstruct deteriorating or poorly built stream crossings with bridges or culverts, ensuring proper alignment and grade.
7. Increase the size of culverts to reduce the amount of highly erosive fill.
8. Low ford stream crossings are appropriate only when site conditions make it impractical or uneconomical to use a permanent or temporary crossing structure.

E. Construction

1. Limit road construction to the dry season (generally between May 15 and October 15). When conditions permit operations outside of the dry season, keep erosion control measures current with ground disturbance, to the extent that the affected area can be rapidly closed/blocked and weatherized if weather conditions warrant.
2. Manage road construction so that it can be completed and bare soil can be protected and stabilized prior to fall rains.
3. Confine construction of pioneer roads to within the roadway construction limits.
4. Conduct pioneer road construction to prevent undercutting the designated final cutslope as well as avoiding the deposition of materials outside the designated roadway limits.
5. Construct embankments out of appropriate materials (no slash or other organic matter) using one or more of the following methods:
 - a. Layer placement (tractor compaction)
 - b. Layer placement (roller compaction)
 - c. Controlled compaction (85 to 90 percent maximum density).

6. Do not sidecast where it will adversely affect water quality or weaken stable slopes.
7. Install surface water drainage measures prior to fall rains.
8. Clear drainage ditches and natural water courses of woody material deposited by construction or logging upstream from culvert installations.
9. Confine major culvert installation from June 15 to September 15 to minimize sedimentation and the adverse effects of sediment on aquatic life.
10. For larger streams, divert streams around culvert installation work areas to minimize sedimentation during construction.
11. On streams with important fishery values, install the culvert as close to horizontal as possible (do not exceed 0.5 percent slope). Place culverts on larger nonfishery streams in the streambed at the existing slope gradient. Energy dissipators (e.g., large rock) placed at the outfall of culverts on small nonfishery streams are recommended to reduce water velocity and minimize scour at the outlet end.
12. Countersink culverts 6 to 8 inches below the streambed to minimize scouring at the outlet. Increase culvert diameters accordingly to minimize chances of plugging.
13. Confine activities by heavy equipment in the streambed to the area necessary for installation or removal of the structure. Restrict construction equipment to within the approved work area and out of the streambed.
14. Permanent stream crossing structures are recommended to be in place before heavy equipment moves beyond the crossing area. Where this is not feasible, install temporary crossings to minimize stream disturbance.
15. Place riprap on any fill material next to culvert inlets and outlets.
16. Where possible, limit the installation and removal of temporary crossing structures to once during the same year, and within the prescribed work period. Installation and removal should occur between June 15 and September 15 to minimize adverse effects of increased sediment on aquatic life.
17. Use rock that is as soil-free as possible with temporary culverts. Whenever possible, use washed river rock covered by crushed rock as a compacted running surface.
18. Spread and reshape clean fill material as close as possible to the original topography after a crossing is removed to keep the stream in its channel during high flow.
19. Limit activities of mechanized equipment in the stream channel to the area that is necessary for installation and removal operations.
20. Remove stream crossing drainage structures and in-channel fill material during low flow and prior to fall rains. Reestablish natural drainage configuration.
21. Use washed rock/gravel in a low water ford crossing if frequent use is anticipated. Surface the approaches with rock aggregate the approaches within 150 feet of each side of a low water ford to minimize washing and softening of the road surface.
22. Construct water bars on dirt roads, spur roads, and skid roads prior to fall rains.

F. Road Renovation/Improvement

1. Change flat gradients to a minimum of two percent or provide raised subgrade sections (turnpike) to avoid accumulation of surface water on the road prism.
2. Reconstruct unstable culvert catch basins to specifications. Reconstruction of catch basins in solid rock is not necessary if culvert entrance specifications are met.
3. Identify potential off-site water problems or excessive flows and add necessary drainage facilities.
4. Identify ditchline and outlet erosion caused by excessive flows and add necessary drainage facilities and armoring.
5. Replace undersized culverts and repair damaged culverts and downspouts.

6. Add additional full-round culverts, half-round culverts and energy dissipators as needed.
7. Correct special drainage problems (i.e., high water table, seeps) that affect stability of subgrade through the use of perforated drains, geotextiles, drainage bays, etc.
8. Eliminate undesirable berms that impair drainage away from the road prism.
9. Restore outslope or crown sections.
10. Avoid disturbing cutbanks while reconstructing ditches or catch basins.
11. Surface inadequately surfaced roads that are to be left open to traffic during wet weather.
12. Require roadside brushing be done in a manner that prevents disturbance to root systems (i.e., prohibit using excavators for brushing).
13. Revegetate all cut and fill slopes by seeding, fertilizing, hydromulching, netting, mulching, and/or planting native trees or shrubs.
14. Install stabilization features such as debris racks, binwalls, and rock blankets as needed.

G. Maintenance

1. Provide the basic custodial maintenance required to protect the road investment and to ensure that erosion damage to adjacent land and resources is held to a minimum. Give high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources.
2. Perform blading and shaping to conserve existing surface material and retain the original crowned or out-sloped self-drainage cross section. Prevent or remove rutting berms (except those designed for slope protection) and other irregularities that retard normal surface runoff. Avoid dumping loose ditch or surface material over the shoulder where it would cause stream sedimentation or weaken landslide prone areas. Avoid undercutting of road cuts.
3. Keep road inlet and outlet ditches, catch basins and culverts free of obstruction, particularly before and during prolonged winter rainfall. Minimize routine machine cleaning of ditches during wet weather.
4. Promptly remove landslide material when it obstructs the road surface and ditchline drainage. Utilize the landslide material for needed road improvements elsewhere or dispose it in a stable waste area. Avoid sidecasting landslide material where it would overload embankments or natural slopes, or flow into downslope drainage courses.
5. Retain vegetation on cut slopes unless it poses a safety hazard or restricts maintenance activities. Accomplish roadside brushing by cutting vegetation rather than pulling it out and disturbing the soil.
6. Reclaim/revegetate all roads not needed for future management activities.
7. Revegetate bare cut and fill slopes.
8. Stabilize major slope failures (landslides) by subsurface drainage, rock blankets, or other methods.

H. Road Closures

1. Barricade or block road surface using gates, guard rails, earth/log barricades, boulders, logging debris or a combination of these methods. Avoid blocking roads that would need future maintenance (i.e., culverts, potential landslides, etc.) with unremovable barricades. Use guard rails, gates or other barricades capable of being opened for roads needing future maintenance.
2. Follow up on road closures to ensure they are maintained in accordance with design criteria.
3. Install water bars, cross sloping or drainage dips if not already on road to ensure drainage.
4. Till with a winged subsoiler. Mulch and/or seed for erosion control and site productivity restoration.

I. Water Source Development

1. Design and construct durable, long-term water sources.

2. Avoid reduction of downstream flow that would detrimentally affect aquatic resources, fish passage or other uses.
3. Direct overflow from water holding developments back into the stream.
4. Locate road approaches in instream water source developments to minimize potential impacts in the riparian zone. Surface these approaches with rock to reduce the effects of sediment washing into the stream.
5. Avoid use of road fills for water impoundment dams unless specially designed for that purpose.
6. Construct water sources during the dry season (generally between May 15 and October 15).

J. Restoration of Rock Quarries

1. Wherever possible, prior to excavation of the site, remove and stockpile topsoil for surface dressing to be used in the reclamation of the site.
2. Use seeding, mulching and drainage to minimize erosion.
3. Rip, water bar, block, fertilize and seed access roads to rock quarries where no future entry is planned. Reclaim depleted quarries to enhance other resource uses.

III. Silviculture

A. Riparian Enhancement

1. Plant conifer and woody riparian species in riparian areas where previous management activities have removed them. Placement of woody debris, creation of snag, or planting of conifers and riparian species would be used where appropriate to restore riparian conditions.
2. Convert suitable alder and brush riparian areas to conifers where water quality is limited. This will reduce nitrates and organic material, and provide new sources for future stream structure (woody debris).

B. Mechanical Methods

1. When using tracked equipment for site preparation, limit the use of such equipment to areas of less than 30 percent slopes.
2. Do not compact skeletal or shallow soils.
3. Till all compacted areas with a properly designed winged subsoiler. This could be waived if inspection reveals that less than two percent of the area is compacted. Compaction of less than two percent is considered to impair less than one percent growth loss.
4. On sites which do not annually dry out enough to provide resistance to traditional tracked equipment, use low-ground-pressure, track-type excavators. The narrow window for dry soils on these sites presents a high risk for impacts, as they do not offer the consistency needed for contract administration. These sites are located in the Udic moisture regime, which is dry less than 45 days within the four months following June, in six years out of ten.
5. Prohibit tractor operations or piling on areas with seasonally high water tables.
6. Restrict tractor operations to dry conditions with less than 25 percent soil moisture content in the upper six inches of soil.
7. Construct small diameter piles or pile in windrows.
8. Avoid piling large logs and stumps.
9. Pile small material (3 to 8 inches diameter size predominantly).
10. Burn piles when soil and duff moistures are high.

11. On soils with rocky surfaces, such as those coded as FSR1 in the Timber Production Capability Classification and those with identified low fertility levels, require excavators for mechanical site preparation, regardless of moisture limitations. These sites are highly sensitive to productivity loss from surface disturbance and compaction. Tillage of the rocky soils (FSR1) is usually beyond equipment capability and will cause a further decrease in productivity due to mixing.

C. Chemical Methods

1. Refer to BLM 1992 Record of Decision Western Oregon Program - Management of Competing Vegetation.
2. Select areas for fertilization listed as Timber Production Capability Classification FNR (low nutrient).
3. Mitigate impacts from past practices (e.g., intense burns) through fertilization of affected areas.
4. Avoid aerial application of chemicals when wind speeds would cause drift.
5. Locate heliports and storage areas away from stream channels.
6. Allow no chemical loading operations or similar toxic pollutant activities within 200 feet of all water bodies.
7. Do not apply chemicals within 100 feet of perennial streams, or channels with beneficial uses(s) recognized by the state.
8. Do not apply chemicals into intermittent streams or channels without beneficial use(s) recognized by the state.

D. Broadcast Burning

1. An Oregon State Office guide (U.S. Department of the Interior, BLM 1982) describes a procedure to identify and place soils into three categories - highly, moderately, and least sensitive. These categories are based on the sensitivity of specific soils to impacts from burning:

Category 1 - Highly sensitive soils

- Soils less than 20 inches deep.
- Soils with less than four inches of A horizon.
- Granite and schist soils on slopes exceeding 35 percent.
- Soils on slope gradients exceeding 70 percent.

Category 2 - Moderately sensitive soils

- Moderately deep and deep nonskeletal soils on southerly and westerly aspects with slopes less than 65 percent.
- Moderately deep and deep skeletal soils.
Granite and schist soils on slopes less than 35 percent.
- Moderately deep and deep soils with ochric epipedons (light colored surface layers).

Category 3 - Least sensitive soils

- All soils not included in categories 1 and 2.

The following is best management practices guidance for each category:

Highly sensitive soils - avoid burning.

Moderately sensitive soils - reduce disturbance, fire intensity and duration using the following methods:

- Burn under conditions that create low intensity fires.
- Burn when soils or duff are moist.
- Limit use of tractors in fireline construction, and when used, to areas with less than 35 percent slopes. Construct water bars.
- Avoid burning sparsely vegetated areas on slopes greater than 65 percent.
- Gross yard to break up heavy slash concentrations.

Least sensitive soils - burn by prescription and avoid hot burns.

The BLM manual lists the following maximum desired percent bare soil exposed from burning for the three categories of soils: category 1 - 15 percent; category 2 - 30 percent; category 3 - 40 percent.

2. Fire Trails

- a. Use hand-constructed fire trails.
- b. Avoid the use of tractor-constructed fire trails on small units since the percentage of the area impacted is magnified by the unit's small size. Calculate the area compacted from yarding, landings and fire trails. Keep the impacted area to less than 12 percent.
- c. Construct tractor fire trails using a brush blade with one pass construction when the soil is dry. Make final clearing by hand.
- d. Where fire trail construction has caused compacted surfaces, till and waterbar fire trails. Use a properly designed winged subsoiler.
- e. Avoid placement of tractor-constructed fire trails on slopes greater than 35 percent.
- f. Avoid placement of any fire trails where water would be channeled into areas of instability or headwalls.
- g. Waterbar fire trails that may carry water to minimize surface erosion.

IV. Other Activities

A. Firewood

1. Apply a seasonal restriction on firewood cutting when access to cutting area is on an unsurfaced road.
2. Clean all road surfaces, ditches and catch basins of debris from wood cutting.

B. Wildfire Control

1. Limit use of heavy equipment near riparian areas and on steep slopes when possible. Where fire trail entry into a riparian area is essential, angle the approach rather than have it perpendicular to the riparian area.
2. Attempt to keep fire retardant out of water sources.
3. Utilize information from burned area surveys to determine if watershed emergency fire rehabilitation is needed.
4. Develop a fire rehabilitation plan through an interdisciplinary process.
5. Select treatments on the basis of on-site values, downstream values, probability of successful implementation, social and environmental considerations (including protection of native plant community), and cost as compared to benefits.
6. Examples of emergency fire rehabilitation treatments include: 1) seeding grasses or other vegetation as needed to provide a protective cover as quickly as possible; 2) mulching with straw or other suitable material; 3) fertilizing; 4) channel stabilization structures; 5) trash racks above road drainage structures; and 6) water bars on fire lines.

C. Watershed Rehabilitation and Fish Habitat Improvement Projects

1. Use an interdisciplinary team.
2. Use corrective measures to repair degraded watershed conditions. Restore to predisturbance conditions with a vegetative cover that will maintain or improve soil stability, reduce surface runoff, increase infiltration, and reduce flood occurrence and flood damages.
3. Carefully plan access needs for individual work sites within a project area to minimize exposure of bare soil, compaction and possible damage to tree roots. Utilize existing trails to the extent practical.
4. Confine work timing in stream channels in accordance with the memo from the Oregon Department of Fish and Wildlife (July 1986) Oregon guidelines for timing of in-water work to protect fish and wildlife

resources.

5. Keep equipment out of streams to the extent possible.
6. Limit the amount of streambank to ensure stability of enhancement structures. Place excavated material above the high water mark to avoid its reentry to the stream.
7. Whenever possible, obtain logs for habitat improvement structures from outside the riparian zone or at least 200 feet from the stream channel to maintain integrity of riparian habitat and streambanks.
8. Inspect all mechanized equipment daily to help ensure toxic materials such as fuel and hydraulic fluid do not enter the stream.
9. Utilize water bars, barricades and seeding to stabilize bare soil areas.
10. Place woody debris in riparian areas and streams, create snags and plant conifers and woody riparian vegetation where previous management activities have removed them.
11. Design water source developments and improvements to protect riparian values.
12. Manage livestock use of riparian areas by fencing, other water source development, livestock numbers, and/or season of use.

D. Mining

1. Require the claimant to obtain all required state and federal operating permits.
2. Locate, design, operate and maintain sediment settling ponds in conformance with Oregon Department of Environmental Quality guidelines.
3. If possible, design, locate and construct stream crossings in conformance with practices described in sections II.D and II.E.
4. Use existing roads, skid trails and stream crossings whenever possible.
5. Adequate drainage of surface runoff will be necessary for roads that are constructed or reconstructed for vehicular access to the mining area. If roads are to be utilized during winter months (October 15 - April 15) surface the roads with rock.
6. Reclaim the mining area and access roads and trails at the conclusion of mining operations.
7. Construct a berm or trench between disturbed areas and water courses when needed to protect water quality.
8. Stockpile topsoil for use during reclamation of the site. In the interim, stockpiled topsoil must be stabilized to prevent erosion and contamination of other resources in the area.
9. If erosion is predicted to occur from October 15 to May 15, contour and mulch disturbed areas that will not be mined for at least 30 days.
10. If possible, retain an undisturbed riparian buffer strip between mining operations and water courses to protect integrity of streambanks, provide for water temperature control, and for filtration of sediment from surface runoff.
11. Whenever possible, confine operations to bench areas rather than allow encroachment on the stream.
12. Locate and maintain sanitation facilities in accordance with state and local regulations and district policies.

E. Wetlands

1. All wetlands destroyed by construction activities will be ameliorated by creating replacement wetland areas.
2. Avoid disturbance of permanent high water table areas.

3. Fall and yard timber away from wetlands.
4. Utilize seasonal restrictions or full suspension over areas when entry is required.
5. Avoid the use of tractors or other ground-based equipment that may disturb the wetlands.
6. Manipulate vegetation to enhance or create springs and wetland areas.

F. Municipal Watersheds

1. Cooperate with affected communities in the development and application of specific constraints and management actions designed to meet their particular needs. Additional protection could include:
 - a. Seasonal and other restrictions on logging.
 - b. Coordination and notification prior to surface disturbing actions.
 - c. Review procedures.
 - d. Sanitary precautions for woods workers.
 - e. Restrictions on access.

Timber Production Capability Classification System

The Timber Production Capability Classification inventory is designed to identify sites capable of sustaining intensive timber management without degradation of their productive capacity. Factors such as soil depth, available moisture, slope, drainage, and stability are evaluated to determine the degree of timber management activity on a particular site. This would include sites capable of sustaining standard timber harvest practices, special practices or limitations to prevent degradation, and sites too fragile to tolerate any timber management without long-term loss of productivity. Legislative requirements and BLM policy specify that timber harvests will be planned and carried out only on lands which can be managed without environmental degradation of the site.

A complete description of the system can be found in BLM State Office Handbook 5251-1, Timber Production Capability Classification. This is available at the district office.

This section describes the fragile codes used in the Timber Production Capability Classification, identifies the concerns associated with each code, and recommends potential practices for management of such areas.

Timber Production Capability Classification Fragile Codes/ Guidance

Fragile Nonsuitable Woodland Soil Moisture (FSNW)

Soils on these sites are excessively well drained. Soils have a very low available water holding capacity and are subject to being dry for long periods during spring and summer months. Vegetation communities are primarily uneven-aged, open-grown Douglas-fir with a low vigor ground cover of salal. Soils typically have sandy or gravelly textures with coarse fragments consisting of more than 70 percent of the top 12 inches of the soil. Available water holding capacity is generally between 0.5 and 1 inch.

Concerns

Because of the limited soil resource, survival of newly planted vegetation is low. Any site disturbance severely reduces the future productivity potential. These losses cannot be mitigated even using best management practices.

Recommended Practices

Manage for nontimber uses.

Fragile Suitable Restricted Soil Moisture (FSR1)

Sites with thin light-colored topsoils and coarse, sandy or gravelly, often shallow soils with low moisture storage capacity. Available water holding capacity in the top 12 inches ranges from 1 to 1.5 inches.

Concerns

Because of low moisture supplying capacity and thin topsoil, soil displacement or compaction significantly impacts the growth of biomass. Soil compaction or displacement further reduces the soil's ability to absorb and store moisture, reducing survival and growth of conifer seedlings.

Recommended Practices

- Avoid ground-based logging equipment.
- Avoid wet season yarding except with suspension of logs.
- Avoid scarification or tilling of soil.
- Avoid tractor-constructed fire trails.
- Burn slash only when fire intensity will be low (see burning guidelines).

Fragile Suitable Restricted Compaction (FSR2)

More than 12 percent of the area is compacted or the area was scarified and a high percentage of the topsoil is compacted and/or displaced.

Concerns

Soil compaction and displacement causes reduced survival and growth of planted conifers. Increased runoff and erosion may be occurring from the compacted surfaces.

Recommended Practices

- Till with properly designed winged subsoiler.
- Add organic matter to surfaces of displaced soil to improve productive potential.
- Where sites have been completely cleared of debris and topsoil, replace topsoil by dragging and resspreading topsoil from piles or concentrations.
- Drain low spots or blocked drainages to improve natural drainage.
- Use nitrogen-fixing plants to enhance nutrient levels on severely disturbed sites.

Fragile Nonsuitable Woodland Nutrient (FNNW)

Soils on these sites are low in nutrients or have a nutrient imbalance that inhibits tree growth. Soils on this site are very gravelly or shallow, generally mapped with FSNW, or already produce less than 20 cubic feet per acre per year.

Concerns

Forest management activities reduce site productivity below the threshold level for commercial forest (20 cubic feet per acre per year).

Recommended Practice

Manage for nontimber uses.

Fragile Suitable Restricted Nutrient (FNR1)

Soils on this site are typically well to excessively drained. They occur primarily on ridges and ridge noses or steep (greater than 70 percent) convex hillslopes, at elevations typically above 2,800 feet (Salem District). Parent material is frequently volcanic tuff or breccia, and high in ash. Soils typically have thin topsoils. Organic matter turnover rates are slow and a high proportion of site nutrients is stored in the above ground biomass. Associated vegetation consists of primarily Pacific silver fir and noble fir with associated cold-tolerant understory species such as rhododendron and beargrass.

Concerns

The highest demand for plant nutrients occurs during the first 15 to 20 years after a plantation is established. Removal of nitrogen on sites already below optimum levels for growth would have an immediate impact on new plantations. While soil nutrients can be replaced after 80 to 100 years through natural precipitation, nutrients in deficient soils will not be available in sufficient quantities during the period of maximum need by the young stand of trees. Studies indicate that scarification and burning that cause high biomass removal on nutrient-deficient soils could have an immediate detrimental impact on growth.

Recommended Practices

- Avoid burning on these sites when possible. Usually plant competition is not a factor on low fertility sites. (see burning guidelines)
- Avoid burning on steeper slopes and southerly aspects.
- Encourage nitrogen-fixing vegetation.
- Use fertilizer to increase nutrient levels.
- Avoid use of ground-based yarding equipment such as tractors and rubber-tired skidders.
- Avoid scarification and tractor slash piling.
- Plant and thin trees to wider spacings.
- Consider extended rotations.

Fragile Suitable Restricted Nutrient - Impacted From Past Management (FNR2)

Lower fertility sites impacted by yarding, scarification, or slash burns, resulting in lowered site productivity.

Concerns

Site productivity has been significantly reduced by loss of soil nutrients and organic matter.

Recommended Practices

- Encourage growth of nitrogen-fixing plants.
- Thin trees to wider spacings.
- Use chemical fertilizers to increase soil nutrients.

Fragile Suitable (very) Restricted Nutrient (FNR3)

Very slow-growing stands of Douglas-fir and hemlock at higher elevations. Understory includes low vigor rhododendron and beargrass.

Concerns

Any loss of soil nutrients from logging could shift these areas into a low site category.

Recommended Practices

- Use practices listed for Timber Production Capability Classification FNR1.
- Do not burn.
- Do not use ground-based equipment.
- Keep any soils disturbance to a minimum.

Fragile Unsuitable Woodland Slope Gradient (FGNW)

Slopes greater than 80 percent adjacent to streams and in headwalls of drainages.

Concerns

Logging or road construction activity is likely to accelerate surface erosion and/or trigger slides or debris avalanches into streams.

Recommended Practices

- Manage for uses other than timber production with a primary emphasis on maintaining water quality.
- Avoid and buffer these sites whenever possible, especially if there are indicators of instability.
- If included in timber sale units, fall and yard away or use full suspension. Buffer the headwalls or streams.

Fragile Suitable Restricted Slope Gradient (FGR1)

Steep slopes of 70 to 80 percent adjacent to streams or in headwalls of drainages. Soils are shallow to moderately deep, noncohesive and gravelly.

Concerns

Logging or road construction may accelerate soil erosion, raveling and sliding; may contribute to debris avalanches. When such materials enter streams, there are serious impacts to water quality and riparian (streamside) vegetation.

Recommended Practices

- Avoid placing roads in headwalls steeper than 70 percent or minimize sidecasting of excess road construction materials.
- Avoid practices that add water to headwalls or disrupt the natural drainage.
- Monitor culverts in high hazard areas during high runoff events.
- Avoid placement of new materials into slide areas.
- Direct road runoff into ditch lines by insloping or use of dips.
- Place downspouts on culverts where they discharge onto steep slopes.
- Yard logs using full suspension.

Fragile Nonsuitable Woodland Mass Movement Potential (FPNW)

These sites have active deep-seated slump-earthflow mass movements. Vegetation is primarily alder, bigleaf maple, Douglas-fir, and hemlock, with understories of vigorous sword fern, salmonberry, and other water-tolerant species. The trunks of many of the trees are commonly curved and leaning in various directions. Sites include areas (a) which are unproductive because the soils have been removed by past sliding, (b) where movement rates are rapid, precluding even shortened harvest rotations, or (c) where movement rates are resulting in jack strawed trees.

Concerns

Management activities could cause accelerated slope movement and slope failures. Because of the rapid rates of movement, forest management is not feasible on these sites.

Recommended Practices

- Avoid disturbance on these areas.
- Avoid unloading bottoms of slides.
- Avoid loading tops of slumps.
- Divert road drainage away from unstable areas.
- Evaluate unstable slopes and design measures to enhance their stability.

Fragile Suitable Restricted Mass Movement Potential (FPR1)

These sites occur primarily in undulating topography containing depressions and sag ponds. Parent material is primarily sedimentary rock associated with parallel bedding planes, with sills of diorite, or with tuff and breccia. Slopes of the slump scarp may be steep but the average hillslope is on gradients of less than 60 percent. Soils are typically deep and highly productive.

Vegetation varies depending on the depth to a water table ranging from Douglas-fir and salal to sag ponds with swordfern, oxalis, devils club, and associated water-tolerant species. Sites actively moving contain curved conifer stems and may contain tension cracks and sag ponds.

Concerns

These sites are subject to slow mass movement. Any practice that increases weight or soil pore pressure, or reduces support at the toe, accelerates movement. Runoff from compacted soil on roads and skid trails that diverts water into unstable areas is a common cause of increased instability.

Recommended Practices

- Avoid unloading bottoms of slides.
- Avoid loading tops of slumps.
- Divert road drainage away from unstable areas.
- Maintain or reestablish natural drainage after harvest operations.
- Evaluate unstable slopes and design measures to enhance their stability.

Fragile Nonsuitable Woodland Surface Erosion Potential (FMNW)

Sites that occur on slopes greater than 90 percent not adjacent to streams or headwalls. The coarse, usually somewhat shallow soil is moving downslope, accumulating on the upper sides of trees and other obstacles.

Concerns

The disturbance from timber harvest or slash burning increases surface erosion to a greater rate. This creates unacceptable losses in potential productivity.

Recommended Practices

Manage for uses other than timber production with the primary emphasis on erosion control, watershed and other nontimber uses.

Fragile Suitable Restricted Surface Erosion Potential (FMR1)

Sites with steep, convex (upper) sideslopes of 70 to 90 percent. Parent materials are primarily thick-bedded sandstone, marine basalt, or andesite. Soils typically have shallow, gravelly, thin topsoils. Vegetation is primarily drought-tolerant Douglas-fir with an understory of Oregon grape, salal, and/or rhododendron.

Concerns

Disturbances from logging and slash burning create increased dry ravelling of soil, losses of soil nutrients, and covering of newly planted seedlings.

Recommended Practices

- Use full log suspension when feasible. Otherwise, employ one-end suspension during dry soil conditions, or use an energized carriage with lateral yarding capabilities. Minimize the amount of the area impacted by cable yarding skid trails.
- Avoid burning to maintain vegetative cover and the duff layer.
- Leave large cull logs on the unit to help impede soil movement.
- Encourage nitrogen-fixing plants.
- Consider grass or forb seeding on disturbed areas where moisture is not a limiting factor.

Fragile Nonsuitable Woodland Ground water (FWNW)

Very poorly drained areas, with water at the surface for much of the year. Vegetation includes scattered alder and cottonwood with an understory of salmonberry, skunk cabbage, sedges or rushes, and devils club.

Concerns

Commercial conifer trees are unable to survive on these sites except on scattered hummocks or mounds with better drainage. The high water table makes it easily damaged by timber management or other activities.

Recommended Practices

Manage for uses other than timber production with primary emphasis on water quality and wildlife.

Fragile Suitable Restricted Ground water (FWR1)

Very moist, poorly drained sites. Usually in depressions or adjacent to streams or unstable areas where the water table is near the surface much of the year. Vegetation is dominated by alder and western hemlock overstories, and oxalis, vine maple, and swordfern understories. Salmonberry and devils club are minor components.

Concerns

These sites may contain water-tolerant species, but removal of trees could reduce transpiration rates. Yarding may disrupt surface water flows. This can raise the water table and increase the time in which soils are wet. This, in turn, could reduce production, increase competition of unwanted vegetation, and change the adapted species.

Recommended Practices

- Minimize practices that disrupt natural drainage, such as dragging logs through wet areas or leaving skid trails that block natural drainage.
- Avoid use of ground-based logging equipment when soils are wet.
- Avoid scarification.
- Seed ground cover to reduce invasion of water-tolerant vegetation.
- Plant species adapted to the site, such as western hemlock, western redcedar, or alder. Avoid planting Douglas-fir.

Appendix H

Management of Candidate Areas of Critical Environmental Concern Dropped from Area of Critical Environmental Concern Consideration

Site	Acres	Site Description / Reason Not Proposed	Managed for:
Brightwood Bog	12	High elevation cold bog supporting a large stand of cedar trees and exhibiting cedar nurse log process. / It is likely that similar sites are found in the general area; need for special management is not apparent.	General Forest Management Area, Riparian Reserve.
Clackamas River	67	Willamette Valley forested riparian habitat on alluvial terrace deposits. / Similar areas exist in the region; this site is not unique.	General Forest Management Area, Riparian Reserve, wild and scenic river.
Down and Out	27+	An area providing habitat for <i>Poa marcida</i> . Site would also provide a caution zone for the existing Sheridan Peak Area of Critical Environmental Concern. / This area is similar to numerous other areas of <i>Poa marcida</i> habitat; site is not unique.	Late-Successional Reserve.
Grassy Overlook	28	Habitat for <i>Pleuricospora fimbriolata</i> . / <i>Pleuricospora fimbriolata</i> does not qualify as important as defined in BLM Manual 1617. The site is similar to other areas in the region.	Late-Successional Reserve.
Little N.F. Wilson River	1,620	Area of important wildlife and riparian habitat. / Majority of values occur on private lands on which BLM has no management jurisdiction. BLM administers a very small portion of this area.	Late-Successional Reserve.
Lukens Creek	560	Steep, north-facing slopes adjacent to Lukens Creek, a major steelhead spawning area. / Area does not pose a significant threat to human life. Soils and plant communities are not uncommon. Fisheries values are not currently or potentially threatened.	Late-Successional Reserve.
Marmot/Sleepy Hollow	637	Site located in Mt. Hood travel corridor viewshed; contains wildlife habitat, domestic watershed, scenic, and historic landscape scenery values. / Wildlife habitat is not unique or unusual in the region. Scenic value is not significant in terms of entire viewshed.	General Forest Management Area, Riparian Reserve.

Management of Candidate Areas of Critical Environmental Concern Dropped from Area of Critical Environmental Concern Consideration (continued)

Site	Acres	Site Description / Reason Not Proposed	Managed for:
Ringo	80	A natural system/process characterized by a mature redcedar/Douglas-fir stand in a low elevation, northern Willamette Valley setting. / This site is not a representative or natural stand, nor is it uniquely qualified for research, one-of-a-kind, or even especially rare.	General Forest Management Area.
Siletz River	7	A site containing bald eagle and great blue heron habitat in an old growth Sitka spruce community along an upper tidal zone. / Research value has not been established. No threat to resource values (riparian and anadromous fish habitat), if land exchange is not approved.	Late-Successional Reserve, Riparian Reserve.
Table Mtn.	649	An area containing ecological and natural systems/process values. / Area does not provide unique or unusual wildlife habitat. Nepheline syenite present in the area is unique, but not geologically sensitive.	Late-Successional Reserve.
Tally Creek	136	Site contains a mix of mesic and xeric plant species in the interstitial zone between the high and low Cascade Range. / This mix of species is not unusual in this general vicinity.	General Forest Management Area, Riparian Reserve.
Waterloo	13	Diverse habitat area containing mesic and dry forests and grassy glades. / This is an impacted system (previous logging and grazing), and is not a natural, native system.	General Forest Management Area, Riparian Reserve.

Sources: Western Oregon Digital Data Base and Salem District special area files.

Appendix I

Wild and Scenic River Suitability Assessments

Introduction

This appendix contains suitability assessments for two river segments determined to be eligible for inclusion as components of the National Wild and Scenic Rivers System. These are:

- Molalla River (Segment B)
- Nestucca River (Segment A)

Map 2-5 shows the location of these river segments within the planning area.

Suitability assessments of six other eligible river segments found to be not suitable for inclusion as components of the national system are located in appendix 2-L of the draft resource management plan/environmental impact statement.

To qualify for suitability assessment in the proposed resource management plan/final environmental impact statement, the BLM must have sufficient administrative control of lands and resources within an approximately one-half mile wide corridor to allow for the protection of river-related values which contribute to the segment's eligibility. For this resource management planning effort, a 40 percent minimum BLM administrative control criteria was used.

Proposed Resource Management Plan/Final Environmental Impact Statement Evaluation Process

The proposed resource management plan/final environmental impact statement process for evaluating which river segments within the planning area have potential for addition to the National Wild and Scenic Rivers System involves three steps. A summary of each evaluation step follows.

- **Determining Eligibility.** To be eligible for inclusion as a component of the National Wild and Scenic Rivers System, a river segment must be free flowing and possess at least one river-related outstandingly remarkable value. These are the only criteria considered in the eligibility determination step.
- **Establishing Classifications.** For each river segment determined to be eligible, a tentative classification of wild, scenic, or recreational river area must be established. River area classification is based on the level and extent of development and accessibility associated with the river segment.
- **Finding of Suitability.** For each eligible river segment assessed in the proposed resource management plan/final environmental impact statement, a finding must be made as to whether or not it would be a suitable addition to the national system of wild and scenic rivers. Section 4(a) of the Wild and Scenic Rivers Act provides the following topical guidance for preparing the proposed resource management plan/final environmental impact statement suitability assessments contained herein.
 1. The characteristics which do or do not make the area a worthy addition to the national system.
 2. The current status of land ownership and use in the area.
 3. The reasonably foreseeable potential uses of the land and water which would be enhanced, foreclosed, or curtailed if the area were included in the national system.
 4. The federal agency which should administer the river area.
 5. The extent to which administrative costs could be shared by state and local government agencies.
 6. The estimated acquisition and administrative costs to the United States should the area be added to the national system.

The January 1991 Salem District *Summary of the Analysis of the Management Situation* stated that all river segments found to be suitable for designation in the proposed resource management plan/final environmental impact statement would be further addressed in a subsequent Legislative Environmental Impact Statement. A Legislative Environmental Impact Statement would enable the Department of the Interior to formally recommend to the President and Congress which suitable river segments should be designated as components of the National Wild and Scenic Rivers System. However, since publication of the analysis of the management situation summary, it has been decided that the proposed resource management plan/final environmental impact statement will be the only document analyzing environmental impacts of the findings of suitability/nonsuitability for the assessed river segments.

Wild and Scenic River Suitability Assessment Molalla River (Segment B)

Finding and Rationale

A 12.4-mile segment of the Molalla River, from its confluence with the Table Rock Fork Molalla River to its confluence with the North Fork Molalla River, is found suitable for designation as a component of the National Wild and Scenic Rivers System. Its tentative classification is recreational river area.

Based on the outstandingly remarkable value comparison of the Molalla River and other rivers in the Statewide Comprehensive Outdoor Recreation Plan region 7 (see SCORP map in accompanying map packet), the Molalla River's recreational and geologic values ranked fourth. Its scenic value did not rank in the top four. The Molalla River is a worthy addition to the National Wild and Scenic Rivers System due to its outstandingly remarkable geologic, recreational, and scenic values. Protection of the river's free-flowing character cannot be ensured through current management or administration. Without designation, the river could be developed for hydropower or water resources at some point in the future, resulting in the irreversible or irretrievable loss of this resource. In addition, the Molalla River offers important local and regional recreation settings and opportunities. As the main access corridor to the BLM-administered Table Rock Wilderness, the river offers complimentary recreational opportunities and provides a natural transition from developed to primitive recreation settings. Designation of the Molalla River would add greatly to the recreational values of the area and region. Maintenance and enhancement of recreational and scenic values would be less likely if the river were not designated.

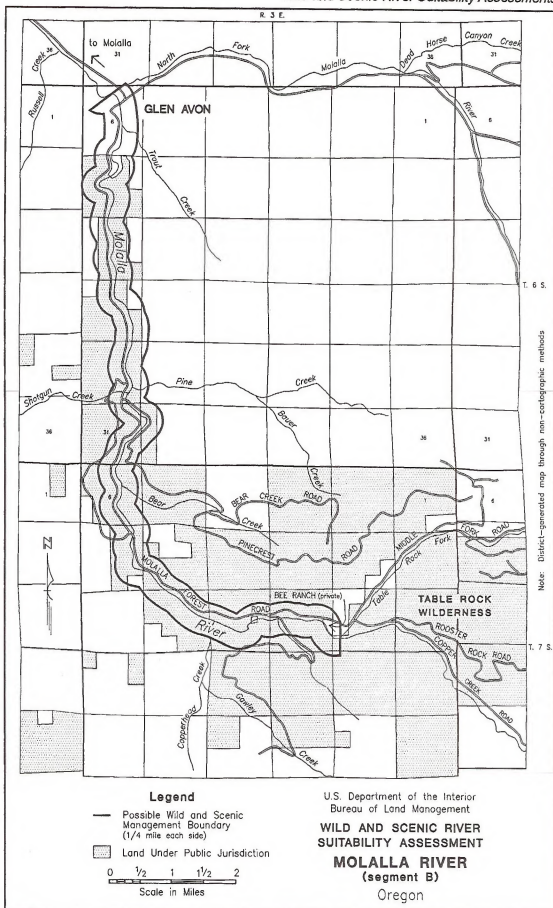
Background

Description of the River

The Salem District Office staff identified as eligible a 12.4-mile segment of the Molalla River from its confluence with the Table Rock Fork Molalla River to its confluence with the North Fork Molalla River. The segment is located in Sections 6, 7, 18, 19, 30, and 31, Township 6 South, Range 3 East, Willamette Meridian, and Sections 6, 7, 8, 15, 16, and 17, Township 7 South, Range 3 East, Willamette Meridian, (see map I-A). The segment lies near the 800-foot level on the western slope of the Cascade Range, about 11 miles southeast of Molalla, Oregon.

The segment flows through a fairly deep, moderately dissected canyon. The canyon contains many points of scenic interest, particularly near the middle portion of the segment, located in a constricted area of the canyon. Adjacent hillsides are covered with primarily mature and second-growth Douglas-fir. Near-vertical cliffs and rock outcrops descend into the river in many locations and add to the corridor's scenic value.

Access to and along this segment is via the South Molalla Road. Primary uses within the corridor include dispersed recreation and timber management activities.



Map I-A Location of Molalla River (segment B)

The lower portion of this segment of the Molalla River was identified as having moderate problems regarding water quality conditions in the 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution. Current water quality does not affect the segment's eligibility for inclusion as a recreational river area component of the National Wild and Scenic Rivers System.

Eligibility Determination

Upon evaluation, the Molalla River was found to be free flowing within the 12.4-mile segment. Three river-related resource values (scenic, recreational, and geologic) were determined to be outstandingly remarkable based on established eligibility criteria. A description of each outstandingly remarkable value follows:

The scenic quality of this river corridor is characterized by a wide range of colors and textures. Colors range from grays and blacks on exposed rock outcrops to greens and browns from a wide variety of vegetative types present within the viewshed. The character of the river ranges from deep clear pools to riffles and cascading whitewater. Many rock outcrops and cliffs descend directly into the river, and large boulders, covered with moss and vegetative growth, add to the scenic quality. Human influences detract slightly from the view in many areas, but the overall impact is not significant.

Recreational opportunities within this river corridor include day hiking, fishing, dispersed camping, picnicking and waterplay. This area attracts visitors originating from within and outside the region to swim and play in the water during summer weekends, and to fish for steelhead in the winter months. Ease of access and diverse opportunities add to the recreational value of this river corridor.

The geological value of this river segment is considered unique and unusual in the region. A series of horizontal columnar basalt rosettes occur near the middle of the segment, providing a regionally rare textbook example of this type of geologic feature. This feature is especially unusual because it has been exposed by the erosional processes of the river itself and can be easily interpreted and observed by visitors.

Tentative Classification

The highest tentative classification for this segment of the Molalla River was found to be recreational river area based on the conditions shown in the following table.

Site Condition	Classification		
	Wild River Area	Scenic River Area	Recreational River Area
Water Resources Development	Meets	Meets	Meets
Shoreline Development	Does Not Meet	Meets	Meets
Water Quality	Meets	Meets	Meets
Accessibility	Does Not Meet	Does Not Meet	Meets

The segment is free of any impoundments or diversions. Streambank modifications include rip-rap areas, bridges and stream channel straightening associated with the South Molalla Road. Shoreline development along this segment includes several structures near the upper portion of the segment, and the community of Glen Avon near the segment's lower terminus. Forest management activities on nearby hillsides are visible in many areas along the segment. Water quality and quantity are relatively good and support the identified outstandingly remarkable values (see previous discussion of water quality in this part).

Access along this segment is via the South Molalla Road, a heavily used, paved, two-lane BLM road that roughly parallels the entire river segment. From the river, the road is visible in many places. Vehicular noise is noticeable from all but a few locations along the river. The road is primarily used for recreational access to the river corridor and Table Rock Wilderness, and for access to areas being managed for timber production.

Public Comment

The BLM, as part of its resource management plan process, solicited public review and comment on the district's analysis of the management situation. Public comment regarding this segment's eligibility and tentative river area classification determination was minimal. Of the comments received, most were concerned with the Wild and Scenic Rivers Act and provisions of the act rather than this particular segment's eligibility or tentative classification determination.

Suitability Factors

Current Land Status and Use

Eighty-four percent of the lands (3,303 acres) within the approximately one-half mile wide potential river corridor are administered by the BLM Salem District. The remainder of the corridor is privately owned.

Landowner	Approximate Acres Within One-half Mile Wide Corridor	Percent of Total Area Within Corridor
Public: BLM	3,303	84
Private:		
Cavenham Forest Industries	626	16
Other Private	5	0
Total	3,934	100

Current land use within the approximately one-half mile wide river corridor includes dispersed recreation and timber management activities. Timber on approximately 100 acres within the corridor has been harvested in the past 15 years.

Reasonably Foreseeable Uses of the Land and Water Affected by Designation

Appendix J of this proposed resource management plan/final environmental impact statement provides a general description of land uses and management practices appropriate for wild, scenic, and recreational river areas. Consequences by plan alternative are displayed in appendix AA.

Designation under the recreational river area classification would result in a continuation of current management, except that the BLM's management presence would increase dramatically. This would potentially diminish inappropriate activities and thus enhance recreational use and visitor experience expectations within the river corridor. In addition, if this segment were designated, more funding may be available to improve road maintenance, to complete activity planning within the corridor, to increase management presence, and to initiate facility development and visitor interpretation.

Designation under the recreational river area classification would not lead to the foreclosure of any current or reasonably foreseeable potential uses of the land and water.

Designation under the recreational river area classification would curtail timber harvest if any proposed harvest activities would reduce the overall scenic quality of the corridor to less than an outstandingly remarkable condition.

The potential hydropower theoretically available from this segment of the Molalla River is approximately 17,300 kilowatts (see introduction for more information).

There are no Federal Energy Regulatory Commission applications or other proposals for dams or diversions on file for this river segment.

Effects On Outstandingly Remarkable Values

Designation would ensure that the scenic qualities of this river corridor would be maintained. Forest management activities determined to adversely impact the scenic quality of the area would be constrained.

Recreation activities including fishing, hunting, camping, picnicking, swimming and general waterplay would be enhanced by designing timber management activities to protect scenic values. In addition, an increased management presence may help deter some undesirable activities associated with unregulated use, e.g., litter, vandalism, and trespass onto privately owned lands.

Designation would maintain the geological value of this river segment by ensuring that no future uses or management in this corridor would impact the outstanding geological feature associated with this segment. Designation would also provide greater opportunity for interpretation and educational study of this feature.

Scenic values would be reduced somewhat due to less restrictive measures and considerations for resource management activities. Timber harvest activity in the river corridor would potentially result in a reduction of the overall scenic quality. Scenic values would be given somewhat less consideration in the planning and layout of timber sales within the corridor. Man-made improvements including recreational facilities and roads would be similarly less restricted.

Geologic values would be degraded or lost if quarry development activities or impoundments would occur.

If the river segment were not added to the National Wild and Scenic Rivers System, the BLM intends to manage lands and resources under its jurisdiction within the approximately one-half mile wide river corridor in accordance with allocations of the proposed resource management plan. These allocations would be Riparian Reserve, Late-Successional Reserve and Matrix. Only a small portion of the corridor falls within a Late-Successional Reserve and several areas fall under restrictive Timber Production Capability Classifications. Nearly the entire corridor would be managed within the framework of an activity plan that would emphasize recreation opportunities in the area.

Administering Agency

If this segment of the Molalla River were ultimately designated by Congress as a component of the National Wild and Scenic Rivers System, the BLM would be the logical managing agency.

Cost of Administration

The estimated cost of preparing a required river management plan would be \$100,000. Estimated annual river management, administration, and monitoring costs would be \$40,000. Cost estimates for implementing resource protection measures and developing necessary public use facilities would be determined through the river management planning process.

No state or local agency would be expected to share in the cost of future administration or management.

Acquisition costs to the United States would not be expected with designation of this segment due to the greater than 50 percent federal control of land within the corridor.

Wild and Scenic River Suitability Assessment Nestucca River (Segment A)

Finding and Rationale

A 15.3-mile segment of the Nestucca River, from Ginger Creek to the western boundary of Township 4 South, Range 7 West, Willamette Meridian, is found suitable for designation as a component of the National Wild and Scenic Rivers System. Its tentative classification is recreational river area.

Based on the outstandingly remarkable value comparison of the Nestucca River and other rivers in the Statewide Comprehensive Outdoor Recreation Plan region 5 (see SCORP map in accompanying map packet), the Nestucca River's recreation and fish values ranked first and its scenic value ranked third. The highly scenic drive along the BLM-administered Nestucca River National Back Country Byway, the diversity of recreational opportunities along the corridor and the high quality fish habitat make this segment suitable for designation as a component of the National Wild and Scenic Rivers System.

It should be noted that all of the river-related values would be protected under other protective allocations.

Although the BLM received substantial public comment on the Nestucca River, most concerns pertained to the lower portion of the river (segment B) which is predominantly in private ownership. Very little opposition was expressed concerning segment A. However, this was because respondents assumed that adequate management and administration would occur concurrently with the projected increase in visitor use.

Background

Description of the River

The Salem District Office staff identified as eligible a 15.3-mile segment of the Nestucca River from its confluence with Ginger Creek to the western section line of Section 7, T. 4 S., R. 7 W., W.M.. The segment is located in Sections 7, 8, and 9, T. 3 S., R. 6 W., W.M., Sections 13, 24, 26, 27, 28, 31, 32, and 33, T. 3 S., R. 7 W., W.M., and Sections 6 and 7, T. 4 S., R. 7 W., W.M., (see map I-B). The segment lies near the 1,200-foot level on the western slope of the Coast Range, about 20 miles southeast of Tillamook, Oregon.

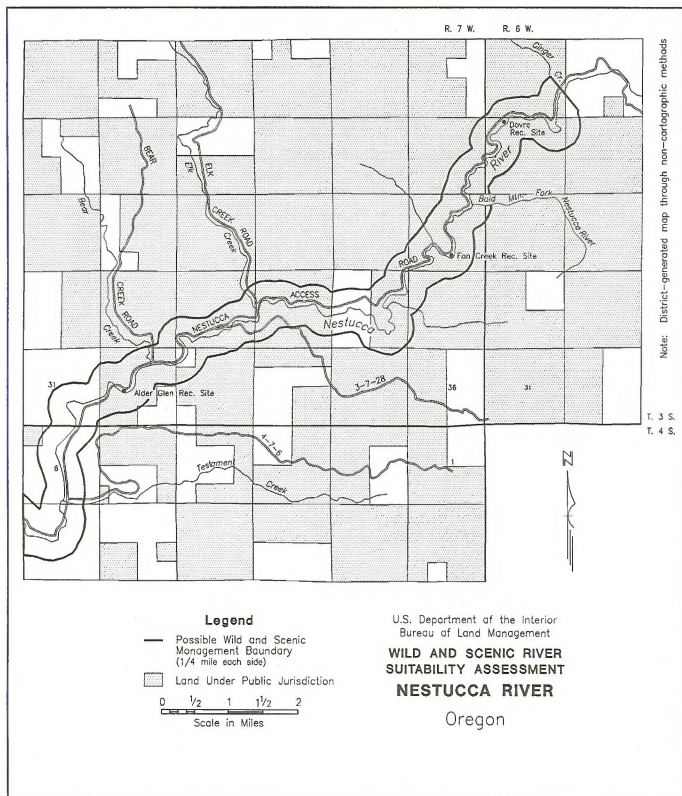
The segment flows through a deep, highly dissected canyon that provides habitat for a wide variety of plant and animal species. Adjacent hillsides are covered with a patchwork of mature Douglas-fir, western hemlock, western redcedar and young plantations. Vertical cliffs and rock outcrops descend into the river in many locations and add to the scenic value of this river corridor.

Access to and along this segment is via the Nestucca Access Road. Present use within the corridor includes recreation and timber management activities.

This segment of the Nestucca River was identified as having moderate problems regarding water quality conditions in the 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution. Current water quality does not affect the segment's eligibility for inclusion as a recreational river area component of the National Wild and Scenic Rivers System.

Eligibility Determination

Upon evaluation, the Nestucca River was found to be free flowing within the 15.3-mile segment. Three river-related values (scenic, recreational, and fish) were determined to be outstandingly remarkable based on established eligibility criteria. A description of each outstandingly remarkable value follows:



Map I-B Location of Nestucca River (segment A)

The scenic qualities of this river corridor include views of a steep, thickly vegetated Coast Range canyon exhibiting a multi-age mix of vegetation with a wide range of colors and textures. Much of the segment flows under a canopy of 200-foot tall Douglas-fir and various hardwood species. In other areas the canopy opens up to reveal hillside views. The scenic values of this river corridor have gained significance since 11 miles of the Nestucca Access Road were dedicated as the BLM-administered Nestucca River National Back Country Byway.

Recreational opportunities within this river corridor include day hiking, camping, picnicking and studying nature (botanical and wildlife observation). Four BLM recreation sites (Alder Glen, Dovre, Elk Bend, and Fan Creek) and one Forest Service campground (Rocky Bend) are located in the corridor and provide facilities for both day and overnight use. In addition to visitors traveling from within the region to participate in their preferred recreational activities, this area attracts many visitors originating from outside the region, especially those wanting to travel the national back country byway.

The fish value of this river segment is considered one of the best in the region, if not Oregon. The Nestucca River ranks among the highest in the region for the production of spring and fall chinook salmon and summer and winter steelhead. Coho salmon, chum salmon, sea-run cutthroat, and resident cutthroat are also present in this segment at various times during the year. Overall fish habitat within this segment is considered very good.

Tentative Classification

The highest tentative classification for this segment of the Nestucca River was found to be recreational river area based on the conditions shown in the following table.

Site Condition	Classification		
	Wild River Area	Scenic River Area	Recreational River Area
Water Resources Development	Meets	Meets	Meets
Shoreline Development	Does Not Meet	Does Not Meet	Meets
Water Quality	Meets	Meets	Meets
Accessibility	Does Not Meet	Does Not Meet	Meets

The segment is free of any impoundments or diversions. Streambank modifications include rip-rap areas, bridges, stream channel straightening associated with the Nestucca Access Road, and fish habitat enhancement structures. Shoreline development along this segment includes the four developed BLM recreation sites, the Forest Service's campground, and several private residences. Forest management activities on adjacent hillsides are generally well screened from the river, but are visible from some areas along the segment. Water quality and quantity are relatively good and support the identified outstandingly remarkable values (see previous discussion of water quality in this part).

Access to and along this segment is via the Nestucca Access Road, a well traveled, paved road that roughly parallels the entire river segment. From the river, the access road is generally well screened, but is still visible in many places. Vehicular noise is noticeable from all but a few locations along the river. The primary uses of this road are for transportation between the Willamette Valley and the Oregon coast, for recreational access to the river corridor, and for access to areas managed for timber production.

Public Comment

The BLM, as part of its resource management plan process, solicited public review and comment on the district's analysis of the management situation. Public comment regarding this segment's eligibility and tentative river area classification determination was substantial. The majority of respondents did not refute the eligibility determination, but opposed the potential designation of this segment. Concerns included: fear of land use restrictions, condemnation, increased visitor use and impacts, and government interference with private citizens' rights.

Suitability Factors

Current Land Status and Use

Seventy-two percent of lands (2,972 acres) within the approximately one-half mile wide river corridor are administered by BLM Salem District. The remainder of the corridor is administered by the Forest Service, Oregon State Department of Forestry, or is privately owned.

Landowner	Approximate Acres Within One-half Mile Wide Corridor	Percent of Total Area Within Corridor
Public:		
BLM	2,972	71
Forest Service	778	13
Oregon State Department of Forestry	107	3
Private:		
Timber Company	543	11
Other Private	80	2
Total	4,484	100

Current land use within the approximately one-half mile wide river corridor includes dispersed and site-oriented recreation activities and timber harvest. Overall recreation use within the corridor is heavy and includes a wide range of activities. Timber production from lands within the corridor is also fairly high. In the past 15 years, timber on approximately 640 acres within the corridor has been harvested.

Reasonably Foreseeable Uses of the Land and Water Affected by Designation

Appendix J of this proposed resource management plan/final environmental impact statement provides a general description of land uses and management practices appropriate for wild, scenic, and recreational river areas. Consequences by plan alternative are displayed in appendix AA.

Designation under the recreational river area classification would result in a continuation of current management, except that BLM's management presence would increase. This would potentially deter inappropriate activities and thus enhance recreational use and visitor experience expectations within the river corridor. In addition, if the segment were designated, more funding may be available to improve maintenance of the existing access road, to complete activity planning within the corridor, and to initiate any planned facility development and visitor interpretation.

Designation under the recreational river area classification would not lead to the foreclosure of any current or reasonably foreseeable potential uses of the land and water.

Designation under the recreational river area classification would not curtail any current or reasonably foreseeable potential uses of the land and water.

The potential hydropower theoretically available from this segment of the Nestucca River is approximately 12,500 kilowatts (see introduction for more information).

There are no Federal Energy Regulatory Commission applications or other proposals for dams or diversions on file for this river segment.

Effects On Outstandingly Remarkable Values

Designation would ensure that the scenic qualities of this river corridor would be maintained. Forest management activities determined to adversely impact the scenic quality of the area would be constrained.

Recreation activities including studying nature (botanical and wildlife observation), pleasure driving and day hiking would be enhanced by designing timber management activities to protect scenic values. In addition, an increased management presence may help deter some undesirable activities associated with unregulated use, e.g., litter, vandalism, and trespass onto privately owned lands.

Designation would maintain and potentially enhance the fish value of this segment through an anticipated increase in funding for fish habitat and riparian area management.

Identified outstandingly remarkable values would not be diminished if designation does not occur. The river-related values would be protected under other protective allocations.

If the river segment were not added to the National Wild and Scenic Rivers System, the BLM intends to manage lands and resources under its jurisdiction within the approximately one-half mile wide corridor in accordance with allocations of the proposed resource management plan. These allocations would be Riparian Reserve and Late-Successional Reserve.

In March 1992, the Oregon State Parks and Recreation Commission approved the classification of the Nestucca River as a recreation river area (in part) and a scenic river area (in part) through the Oregon Scenic Waterways Program. The land management rules set forth in the state's final river management program for the Nestucca River apply to all ownerships within the scenic waterway corridor. With implementation, the river management program should protect the river-related values for which the segment was determined eligible. The Oregon Scenic Waterways Act also prohibits dam construction within the boundaries of the scenic waterway corridor.

In addition, the BLM-administered lands along this segment would be managed as an area of critical environmental concern under an existing area of critical environmental concern management plan. All identified outstandingly remarkable values would be protected under this plan. Portions of the river corridor would also be managed as an riparian management area. The river-related outstandingly remarkable values would be maintained or enhanced through riparian management area management even without the area of critical environmental concern allocation or state scenic waterway designation.

Administering Agency

If this segment of the Nestucca River were ultimately designated by Congress as a component of the National Wild and Scenic Rivers System, the BLM would be the logical managing agency.

Cost of Administration

The estimated cost of preparing a required river management plan would be \$100,000. Estimated annual river management, administration, and monitoring costs would be \$40,000. Cost estimates for implementing resource protection measures and developing necessary public use facilities would be determined through the river management planning process.

Although this segment is a designated state scenic waterway, it would be unlikely that other agencies would share much of the costs associated with management. Local agencies may also be involved due to substantial public interest in the Nestucca River's management; however, management funding from this source would be unlikely as well.

Acquisition costs to the United States would not be expected with designation of this segment due to the greater than 50 percent federal control of land within the corridor.

Appendix J

Management Guidelines and Standards for National Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-542, as amended) established a method for providing federal protection for selected remaining free-flowing rivers, and preserving them and their immediate environments for the use and enjoyment of present and future generations. Rivers are included in the system to benefit from the protective management and control of development for which the act provides. The following guidelines and standards are extracted in part from the February 3, 1970 and August 26, 1982, Department of the Interior and Department of Agriculture guidelines. They would apply to formally designated rivers through incorporation in formal management plans which are normally developed within three years of designation. The guidelines also apply, on an interim basis, to BLM-administered lands along BLM study rivers and other rivers or river segments which have been found by the BLM to be eligible for inclusion as components of the National Wild and Scenic Rivers System. In the latter instance, interim application of the guidelines would continue until lifted by a determination of nonsuitability through BLM's planning (resource management plan) process or by congressional action.

Section 10(a) of the act states that:

"Each component of the national wild and scenic rivers system shall be administered in such a manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its aesthetic, scenic, historic, archaeological, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area."

This section is interpreted by the secretaries of the Interior and Agriculture departments as stating a nondegradation and enhancement policy for all designated river areas, regardless of classification.

Congress, with presidential approval, may determine which river segments will be added to the wild and scenic rivers system. When a river is designated, and the BLM is identified as the administering federal agency, the BLM would establish administrative boundaries to protect the identified outstandingly remarkable values. By law, the land inside the boundaries normally may not exceed an average of 320 acres per river mile over the designated portion of the river. The BLM would delineate boundaries based on natural or manmade features (canyon rims, roads, and ridge tops, etc.) and with consideration of legally identifiable property lines.

A river management plan must also be completed for each designated river by the administering federal agency within three years after designating legislation. Existing state, local, and federal laws continue in effect during the interim along with general Department of the Interior guidelines. If federal designation overlaps state scenic waterway designation, a joint federal/state management plan could be developed. Each management plan would address the roles of federal, state, county, and relevant Indian tribal governments in management of the river.

Management Objectives Common to Wild, Scenic and Recreational River Areas

Fire Protection and Suppression: Management and suppression of fires within a designated river area would be carried out compatible with contiguous federal lands. On wildfires, suppression methods would be utilized that minimize long-term impacts on the river and river area. Presuppression and prevention activities would be conducted to reflect management objectives for the specific river segment. Prescribed fire may be used to maintain or restore ecological condition or meet objectives of the river management plan.

Insects, Diseases, and Noxious Weeds: The control of forest and rangeland pests, diseases and noxious weed infestations would be carried out compatible with the intent of the act and management objectives of contiguous federal lands.

Cultural Resources: Historic and prehistoric resource sites would be identified, evaluated and protected in a manner compatible with the management objectives of the river and in accordance with applicable regulations and policies. Where appropriate, historic or prehistoric sites would be stabilized, enhanced and interpreted.

Water Quality: Water quality would be maintained or improved to meet federal criteria or federally approved state requirements. River management plans shall prescribe a process for monitoring water quality on a continuing basis.

Fish and Wildlife Habitat Improvement: The construction and maintenance of minor structures for the protection, conservation, rehabilitation or enhancement of fish and wildlife habitat are acceptable. This is provided they do not affect the free-flowing characteristics of the river area, are compatible with the river area's classification, the area remains natural in appearance, and the practices or structures are compatible with the surrounding environment.

For clarity sake, the following guidelines are presented for each separate river area classification (recreational, scenic, and wild).

Recreational River Areas

Recreational river areas are defined by the act to be "Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past."

Management Objective for Recreational River Areas

Management of recreational river areas should give primary emphasis to protecting the values which make them outstandingly remarkable while providing river-related outdoor recreation opportunities in a recreational setting. Recreational classification is a determination of the level of development and does not prescribe or assume recreation development or enhancement. In general, a variety of agricultural, water management, silvicultural, recreational, and other practices or structures are compatible with recreational river values, providing such practices or structures are carried on in such a way that there is no substantial adverse effect on the river and its immediate environment.

Management Standards for Recreational River Areas

Forestry Practices: Forestry practices including timber harvest would be allowed under standard restrictions to avoid adverse effects on the river environment and its associated values.

Hydroelectric Power and Water Resource Development: No development of hydroelectric power facilities would be permitted. Existing low dams, diversion works, rip-rap, and other minor structures may be maintained provided the waterway remains generally natural in appearance. New structures may be allowed provided that the area remains generally natural in appearance and the structures harmonize with the surrounding environment.

Mining: New mining claims are allowed and existing operations can continue subject to existing regulations (e.g., 43 Code of Federal Regulations 3809) and any future regulations that the secretary of the Department of the Interior may prescribe to protect values of rivers included in the wild and scenic rivers system. All mineral activity on federally administered land must be conducted to minimize surface disturbance, water sedimentation and pollution, and visual impairment. Reasonable mining claim and mineral lease access would be permitted. Mining claims, subject to valid existing rights, within the recreational river area boundary can be patented only as to the mineral estate and not the surface estate (subject to proof of discovery prior to the effective date of designation).

Road and Trail Construction: Existing parallel roads can be maintained on one or both river banks. There can be several bridge crossings and numerous river access points. Roads, trails, and visitor areas must conform to construction and maintenance standards and be free of recognized hazards.

Agricultural Practices and Livestock Grazing: Lands may be managed for a full range of agriculture and livestock grazing uses, consistent with current practices.

Recreation Facilities: Interpretive centers, administrative headquarters, campgrounds and picnic areas may be established in proximity to the river. However, recreational classification does not require extensive recreation development.

Public Use and Access: Recreation use including, but not limited to, hiking, fishing, hunting and boating is encouraged in recreational river areas to the extent consistent with the protection of the river environment. Public use and access may be regulated and distributed where necessary to protect and enhance recreational river values. Any new structures must meet established safety and health standards or in their absence be free of any recognized hazard.

Rights-of-Way: New transmission lines, natural gas lines, water lines, etc., are discouraged unless specifically authorized by other plans, orders, and laws. Where no reasonable alternate location exists, additional facilities should be restricted to existing rights-of-way. Where new rights-of-way are unavoidable, locations and construction techniques would be selected to minimize adverse effects on recreational river area values and fully evaluated during the site selection process.

Motorized Travel: Motorized travel on land would generally be permitted on existing roads. Controls would usually be similar to that of surrounding lands. Motorized travel on water would be in accordance with existing regulations or restrictions.

Scenic River Areas

Scenic river areas are defined by the act to be "Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads."

Management Objective for Scenic River Areas

Management of scenic river areas should maintain and provide outdoor recreation opportunities in a near-natural setting. In general, a wide range of agricultural, water management, silvicultural and other practices or structures could be compatible with scenic river area values. However, such practices must be implemented without a substantial adverse effect on the river and its immediate environment.

Management Standards for Scenic River Areas

The same limitations set forth for recreational river areas are applicable, except that developments should harmonize with the environment, and any developments on shore lands should be screened from the river. The following program management standards apply:

Forestry Practices: Silvicultural practices including timber harvesting could be allowed, provided they cause no substantial adverse effect on the river and its immediate environment. The river area should be maintained in its near-natural condition. Timber outside the boundary, but within the visual impact area, should be managed and harvested with a special emphasis on visual quality. Preferably, reestablishment of tree cover would be with natural vegetation. Fuelwood cutting would be limited to dead or down materials. Where necessary, restrictions on use of wood for fuel may be prescribed.

Hydroelectric Power and Water Resource Development: No development of hydroelectric power facilities would be permitted. Flood control dams and levees would be prohibited. All water supply dams and major diversions are prohibited. Maintenance of existing facilities and construction of some new structures would be permitted provided the area remains natural in appearance and the practices or structures harmonize with the surrounding environment.

Mining: New mining claims and mineral leases would be allowed. They would be subject to existing regulations (e.g., 43 Code of Federal Regulations 3809) and any future regulations that the secretary of the Department of the Interior may prescribe to protect the values of rivers included in the wild and scenic rivers system. All mineral activity on federally administered land must be conducted in a manner that minimizes surface disturbance, water sedimentation and pollution, and visual impairment. Reasonable mining claim and mineral lease access would be permitted. Mining claims, subject to valid existing rights, within the scenic river area boundary can be patented only as to the mineral estate and not the surface estate (subject to proof of discovery prior to the effective date of designation).

Road and Trail Construction: Roads or trails may occasionally bridge the river area and short stretches of conspicuous roads or long stretches of inconspicuous and well-screened roads could be allowed. Maintenance of existing roads and trails and any new roads or trails would be based on the type of use for which the roads/trails are constructed and the type of use that would occur in the river area.

Agricultural Practices and Livestock Grazing: A wide range of agricultural and livestock grazing uses is permitted to the extent currently practiced. Row crops are not considered as an intrusion of the largely primitive nature of scenic corridors as long as there is not a substantial adverse effect on the natural appearance of the river area.

Recreation Facilities: Larger-scale public use facilities, such as moderate-sized campgrounds, interpretive centers, or administrative headquarters would be allowed if such facilities are screened from the river.

Public Use and Access: Recreation use including, but not limited to, hiking, fishing, hunting and boating is encouraged in scenic river areas to the extent consistent with the protection of the river environment. Public use and access may be regulated and distributed where necessary to protect and enhance scenic river values.

Rights-of-Way: New transmission lines, natural gas lines, etc., are discouraged unless specifically authorized by other plans, orders or laws. Where no reasonable alternate location exists, additional facilities should be restricted to existing rights-of-way. Where new rights-of-way are unavoidable, locations and construction techniques would be selected to minimize adverse effects on scenic river area related values and fully evaluated during the site selection process.

Motorized Travel: Motorized travel on land or water may be permitted, prohibited or restricted to protect river values. Prescriptions for management of motorized use may allow for search and rescue and other emergency situations.

Wild River Areas

Wild rivers areas are defined by the act to include "Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America."

Management Objective for Wild River Areas

Management of wild river areas should give primary emphasis to protecting the values which make them outstandingly remarkable while providing river-related outdoor recreation opportunities in a primitive setting.

Management Standards for Wild River Areas

Forestry Practices: Cutting of trees would not be permitted except in association with a primitive recreation experience, such as clearing for trails, visitor safety, or through control of fires to protect the environment. Trees outside the boundary, but within the visual corridors should, where feasible, be managed and harvested in a manner to provide special emphasis to visual quality.

Hydroelectric Power and Water Resource Development: No development of hydroelectric power facilities would be permitted. No new flood control dams, levees, or other works are allowed in the channel or river corridor. All water supply dams and major diversions are prohibited. The natural appearance and essentially primitive character of the river area must be maintained. Federal agency ground water development for range, wildlife, recreation or administrative facilities may be permitted if there are no adverse effects on outstandingly remarkable river-related values.

Mining: New mining claims and mineral leases are prohibited on federal lands constituting the river bed or bank or located within one-quarter mile from the ordinary high water mark on both sides of the river. Valid existing claims would not be revoked. Existing mining activity would be allowed to continue. This would be subject to existing regulations (e.g., 43 Code of Federal Regulations 3809) and any future regulations that the secretary of the Department of the Interior may prescribe to protect the rivers included in the wild and scenic rivers system. All mineral activity on federally administered land must be conducted to minimize surface disturbance, water sedimentation, pollution, and visual impairment. Reasonable mining claim and mineral lease access would be permitted. Mining claims, subject to valid existing rights, within the wild river area boundary can be patented only to the mineral estate and not the surface estate (subject to proof of discovery prior to the effective date of designation).

Road and Trail Construction: No construction, new roads, trails, or other provisions for overland motorized travel would be permitted within the river corridor. A few inconspicuous roads or unobtrusive trail bridges leading to the boundary of the river area may be permitted.

Agricultural Practices and Livestock Grazing: Agricultural use is restricted to a limited amount of domestic livestock grazing and hay production to the extent practiced prior to designation. Row crops are prohibited.

Recreation Facilities: Major public use facilities, such as campgrounds, interpretive centers, or administrative headquarters would be located outside wild river areas. Toilets, tables, fireplaces, shelters, and refuse containers may be provided as necessary within the river area. These should harmonize with the surroundings. Unobtrusive hiking and horseback riding trail bridges could be allowed on tributaries, but would not normally cross the designated river.

Public Use and Access: Recreation use including, but not limited to, hiking, fishing, hunting and boating is encouraged in wild river areas to the extent consistent with the protection of the river environment. Public use and access may be regulated and distributed where necessary to protect and enhance wild river values.

Rights-of-Way: New transmission lines, natural gas lines, water lines, etc., are discouraged unless specifically authorized by other plans, orders or laws. Where no reasonable alternate location exists, additional facilities should be restricted to existing rights-of-way. Where new rights-of-way are unavoidable, locations and construction techniques would be selected to minimize adverse effects on wild river area values and fully evaluated during the site selection process.

Motorized Travel: Motorized travel on land or water could be permitted, but is it generally not compatible with this river area classification. Prescriptions for management of motorized use may allow for search and rescue and other emergency situations.

Oregon Scenic Waterways Act

In 1969 the state of Oregon passed the Oregon Scenic Waterways Act. This legislation established a program that protects designated rivers throughout Oregon. It is administered by the Oregon Department of Parks and Recreation. Its goals are to protect the free-flowing character of designated rivers for fish, wildlife and recreation. Dams, reservoirs, impoundments and placer mining are prohibited on state scenic waterways. The act requires state review of new development along designated rivers, but it does not affect existing water rights, development or uses.

Management Constraints on Private Lands

Designation of a river under the Wild and Scenic Rivers Act gives the federal government no authority to regulate or zone private lands. Land use controls on private lands are solely a matter of state and local zoning regulations. Although the Wild and Scenic Rivers Act includes provisions encouraging the protection of river values through state and governmental land use planning, these provisions are not binding on local governments. The federal government is responsible for assuring that designated rivers are managed in a manner which meets the intent of the Wild and Scenic Rivers Act.

River management plans may prescribe land use or development limitations to protect outstandingly remarkable river values. Many uses may be compatible with a wild, scenic, or recreational river area classification as long as the rivers are administered to protect and enhance the values which caused them to be included in the wild and scenic rivers system. Most existing uses and activities on adjoining private lands may continue. Timber harvest activities on private lands within a wild and scenic river boundary would continue to be regulated by the Oregon Forest Practices Act.

The primary consideration in any river or land use limitation would be the protection and enhancement of a designated river's outstandingly remarkable value(s). The BLM would work closely with landowners to assure that all uses would be consistent with the intent of the Wild and Scenic Rivers Act. Uses that clearly threaten identified outstandingly remarkable values would be addressed on a case-by-case basis.

Specific management goals for new buildings, other structures or road construction on private lands along designated rivers would be addressed through the individual river management plans. Federal guidelines allow different degrees of development along river areas classified as wild, scenic, or recreational. In consultation with landowners involved, every effort would be made to reduce adverse impacts to an acceptable level on proposals for major upgrading, realignment and/or new construction of roads. Maintenance of existing roads would generally not alter a river area's condition and thus would not be restricted.

On designated rivers, the BLM could negotiate with a landowner to purchase specific development rights necessary to prevent any threat to the river area's identified outstandingly remarkable values if all other efforts fail to reduce anticipated adverse impacts to an acceptable level. Another option, where mutually agreeable, would be a land exchange providing the private landowner with comparable lands outside the administrative boundary of a river.

The Wild and Scenic Rivers Act specifically prohibits the use of condemnation in the fee title purchase of lands if 50 percent or more of the land within the boundary is already in public ownership. While the act provides the federal government authority to purchase scenic, conservation or access easements through condemnation proceedings, this is considered to be a measure of last resort. In the event condemnation were considered necessary, the only landowner rights purchased would be those considered necessary to prevent the identified threat to the river.

If the BLM acquires an easement on private land, depending upon its terms and conditions, public access rights may or may not be involved. For example, a scenic easement could only involve the protection of narrowly defined visual qualities with no provisions for public use. A trail or road easement would involve public use provisions. Provisions for public use of private lands must be specifically purchased from the landowner. The BLM would work closely with landowners to minimize public use of nonfederal lands, through brochures, maps, signs and/or other appropriate means, except in locations where rights to such use are acquired.

Wild and scenic river designation does not affect a private landowner's rights to control trespass. Landowners can charge a fee for crossing private lands to fish designated rivers except where a public access easement exists. The designation of a river into the wild and scenic rivers system does not change landowner rights unless all or a portion of these use rights are acquired from the landowner.

On navigable rivers, the riverbed and banks to the mean high water mark are state lands and are available under state laws for public use. Private landowners control public access to their property along the banks of nonnavigable rivers. The designation of a river into the wild and scenic rivers system has no bearing upon the determination of navigability.

Ownership and use of valid water rights are not affected by a wild and scenic river designation.

Appendix K

Silvicultural Systems and Harvest Methods

General Forest Management Area

Silvicultural systems in the General Forest Management Area would be designed to promote production of merchantable timber, while retaining some larger trees and snags and maintaining forest health and productivity. All treatments would be compatible with the ecological requirements of the communities of native plant and animal species present, and would be tailored to the condition of each stand. The results of watershed analysis would be used to help select and design silvicultural systems through better understanding of landscape-level patterns and ecological processes.

The quality of wood, value of logs ultimately produced, and economic efficiency would be important considerations for all planned treatments.

Lands available for harvest would be managed generally as even-aged stands with partial overstories of larger trees. Management actions would consist of six general types of treatments: regeneration harvest with partial retention; site preparation following harvest; reforestation treatments; management of young stands; commercial thinnings in mid-aged stands; and management of overstory trees, snags, and large woody debris. Each of these treatments is described below.

Silvicultural Treatments

Regeneration harvest Regeneration harvests on available forest lands would generally occur in stands at or above the age of the culmination of mean annual increment. On the Salem District, this varies from stand age 70 to 110 years. Regeneration harvest would not be planned for stands less than 60 years of age.

Site preparation Following regeneration harvest, residual vegetation and logging debris would be treated if necessary to reduce fire hazard, provide room for planting of tree seedlings, lessen initial competition from other vegetation, and limit the cover for seedling-damaging rodents. Methods used would include prescribed fire, manual cutting and piling, and mechanical clearing.

Reforestation Normally, all sites that receive regeneration harvest and do not require burning would be reforested within one year of cutting. If slashing and/or burning is required to prepare site for planting, reforestation may be delayed beyond one year pending burn prescriptions and smoke management clearance. Most areas would be planted with seedlings grown from genetically-selected seed. The selection of tree species, planting density, and stock types would depend on site characteristics, the composition of the original stand, and projected future management of each stand. Areas having identified root disease would be planted with species resistant or immune to the disease or in a manner that would reduce the likelihood of spreading the disease.

Management of young stands During the first ten to fifteen years after planting, young stands would receive treatments as necessary and as funding allows to promote establishment, survival, and growth by managing competing vegetation, protecting seedlings from severe local site conditions, and preventing excessive animal damage. These treatments would include manual cutting of brush and seedling protection measures such as placement of plastic mesh tubes on seedlings and trapping of rodents.

Suitable stands aged 10 to 20 years would receive treatments designed to improve growth, value, and wood quality, when funding is available. These treatments include precommercial thinning, release, pruning, and fertilization.

Commercial thinnings Stands approximately 30 to 70 years of age would be considered for commercial thinning potential. One or two thinnings may be scheduled over the life of an individual stand.

The objectives of commercial thinning may include one or more of the following: to increase the proportion of merchantable volume in the stand, to produce larger, more valuable logs, to anticipate mortality of small trees as the stand develops, to maintain good crown ratios and stable, windfirm trees, to accelerate development of trees which can later provide large-diameter snags and down logs, to manage species composition, or to promote development of desired understory vegetation. Nitrogen fertilizer may be applied following completion of thinnings.

In any case, the decision to thin any given stand would depend on site-specific factors such as slope and topography, distance to roads, soil types, stand density, species composition, and average tree diameter.

Management of overstory trees, snags, and large woody debris During partial-cut or regeneration harvests, existing snags would be reserved from cutting whenever feasible, to the extent necessary to meet snag habitat objectives. Some snags may need to be removed, however, for road construction, for safety reasons, or to make way for log yarding in some situations. The large trees reserved from regeneration harvest would normally not be considered available for future harvest. Some may be damaged or killed during slash burning, while others may blow down or break off during windstorms. Such trees would then become part of the supply of snags and large woody debris. Many of the reserved trees would be likely to survive and grow, providing additional structural and functional habitat diversity as younger stands develop beneath them. Some of the trees reserved for snag recruitment may be topped, girdled, or felled over time to help meet long-range goals for snags and large woody debris.

Selection of harvest areas

Regeneration harvest For available forest lands, treatment areas would be selected when feasible from the least productive stands first. Stands which appear to have low stocking, damage, disease, generally low growth rates, or a predominance of noncommercial species resulting from past management would receive higher priority for harvest.

Commercial thinning Treatment areas would be selected from well-stocked or overstocked stands where density reduction is needed to maintain good diameter growth rates, live crown ratios, and stand stability. Selection of thinning areas may depend on access and logging feasibility.

Landscape design

Harvest units, including regeneration harvest and commercial thinnings, would be placed where needed to meet landscape objectives on three levels of scale: the physiographic province; the landscape block or watershed; and the stand.

Regeneration harvest design

Silvicultural prescriptions for regeneration harvest would be based on knowledge of plant communities, successional relationships, and ecosystem functions. Knowledge of these relationships would be used to help prevent vegetation management problems before they occur. Harvest plans would provide for maintenance of long-term site productivity and forest health.

Regeneration harvest units would vary in size, depending on factors such as ownership, topography, and road locations. Appropriate treatment areas would be determined through watershed analysis.

Harvest unit shapes would be irregular, conforming where possible to topographic features, but limited in many cases by logging feasibility, ownership boundaries, reserve boundaries, other land use allocations, etc. An average of six to eight live trees per acre would be reserved from harvest, as clumps, strips, and scattered individual trees. The distribution of reserved trees would be designed to help meet habitat goals and to minimize interference with log yarding.

In addition to the previous green tree retention management action/direction, green trees would be retained for snag recruitment in timber harvest units where there is an identified, near-term (less than three decades) snag deficit. These trees do not count toward green-tree retention requirements.

Partial-cut harvest design

Commercial thinnings would generally be designed to maintain good volume productivity of the stand. To accomplish this, a stand might be thinned before relative density exceeds 0.60, leaving a residual relative density of approximately 0.40. Depending on stand age, tree size, and the specific objectives of the thinning, stand density after thinning would range from approximately 70 to 110 trees per acre.

Commercial thinning treatment areas would vary in size, depending on factors such as operability and site conditions. Appropriate treatment areas would be determined through watershed analysis. A variety of thinning intensities may be designated within a treatment unit in order to reflect current within-stand spatial patterns or to meet stand development objectives.

In some portions of stands, thinning may consist only of removal of the smaller (intermediate and suppressed) trees in the stand. In other areas, many of the larger codominant and dominant trees may also be removed.

Where root diseases such as laminated root rot (*Phellinus weirii*), black stain (*Ceratocystis verticillidella*) or Port-Orford-cedar root rot (*Phytophthora lateralis*) are present in stands to be thinned, the thinning will incorporate state-of-the-art recommendations for treatment. Openings created will be planted with seedlings of species resistant or immune to the disease, or in a manner to reduce the rate of disease spread.

Connectivity/Diversity Blocks

Silvicultural systems in the Connectivity/Diversity Blocks would be designed to promote development of late-successional forest structure within a longer rotation, while providing an output of merchantable timber and maintaining forest health and productivity. All treatments would be compatible with the ecological requirements of the communities of native plant and animal species present, and would be tailored to the condition of each stand. The results of watershed analysis would be used to help select and design silvicultural systems through better understanding of landscape-level patterns and ecological processes.

The quality of wood, value of logs ultimately produced, and economic efficiency would be important considerations for all planned treatments.

Land available for harvest would be managed generally as even-aged stands with substantial overstories of larger trees. Management would consist of six general types of treatments: regeneration harvest with partial retention; site preparation following harvest; reforestation treatments; management of young stands; density management thinnings in mid-aged stands; and management of overstory trees, snags, and large woody debris. Each of these treatments is described below.

Silvicultural treatments

Regeneration harvest Regeneration harvests on available forest land would be planned for a 150-year area control rotation. This means that no more than approximately one-fifteenth of the available acres in a particular connectivity block would receive regeneration harvest in any decade. On the Salem District, portions of some stands would be cut at stand ages as low as 60 years during the first decade, where older stands are not available or to develop a better distribution of age classes over time. In the second and succeeding decades, regeneration harvest would not be planned for stands less than 70 years of age.

Site preparation Following regeneration harvest, sites would receive treatment of understory vegetation and logging debris if necessary to reduce fire hazard, provide room for planting of tree seedlings, lessen initial competition from other vegetation, and limit the cover for seedling-damaging rodents. Methods used would include prescribed fire (underburning), machine piling, and manual cutting.

Reforestation Normally, all sites that receive regeneration harvest and do not require burning would be reforested within one year of cutting. If slashing and/or burning is required to prepare sites for planting, reforestation may be delayed beyond one year pending smoke management clearance. The selection of tree species, planting density, and stock types would depend on site characteristics, the composition of the original stand and remaining overstory, projected future management of each stand, and distribution of root disease infection. Harvested areas having identified root disease would be planted with species resistant or immune to the disease, or in a manner that will reduce spread of the disease.

Management of young stands During the first ten to fifteen years after planting, understory stands would receive treatments as necessary and as funding allows to promote establishment, survival, and growth by managing competing vegetation, preventing excessive animal damage, and managing overstory density. These treatments would include manual cutting of brush and seedling protection measures.

Suitable stands aged 10 to 20 years may receive treatments designed to improve growth, value, and wood quality, when funding is available. These treatments may include release, precommercial thinning, and pruning.

Density management thinnings Stands approximately 30 to 110 years of age would be considered for density management thinnings. An individual stand may be thinned three to four times at intervals of 20 to 30 years, within one 150-year rotation.

The purposes of density management may include one or more of the following: to accelerate growth of trees which would later provide large-diameter snags and down logs, to promote development of understory vegetation and multiple canopy layers, to produce larger, more valuable logs, to harvest mortality of small trees as the stand develops, to maintain good crown ratios and stable, windfirm trees, and to manage species composition.

The decision to thin a particular stand would depend on site-specific factors such as slope and topography, distance to roads, soil types, stand density, species composition, average tree diameter, and degree of structural variability in the stand.

Management of overstory trees, snags, and large woody debris During partial-cut or regeneration harvests, existing snags would be reserved from cutting whenever feasible to the extent necessary to meet snag habitat objectives. Some snags would need to be removed, however, for safety reasons, for road construction, or to make way for log yarding in some situations.

The large trees reserved from regeneration harvest would not normally be considered available for future harvest. Some may be damaged or killed during slash burning, while others may blow down or break off during windstorms. Such trees would become part of the supply of snags and large woody debris. Most of the reserved trees would be likely to survive and grow, providing substantial structural and functional habitat diversity as the canopies of younger stands develop beneath them.

Some of the trees reserved for snag recruitment may be topped, girdled, or felled over time to help meet long-range goals for snags and large woody debris.

Selection of harvest areas

Regeneration harvest Treatment areas would be selected from mature stands having the least degree of late-successional forest structure. In addition, the more productive stands would be deferred so that the less productive stands would be harvested first, when feasible. Stands which appear to have low stocking, damage, disease, generally low growth rates, or a predominance of noncommercial species resulting from past management would receive higher priority for harvest.

Density management thinnings Treatment areas would be selected from well-stocked stands where density reduction is needed to promote development of late-successional forest structure. This would generally be stands which are predominantly even-aged, evenly spaced, and of a fairly uniform diameter and height. Selection of thinning areas would also depend on access and logging feasibility.

Landscape design

Harvest units, including regeneration harvest and density management thinnings, would be placed where needed to meet landscape objectives on three levels of scale: the physiographic province, the landscape block or watershed, and the stand.

Regeneration harvest design

Silvicultural prescriptions for regeneration harvest would be based on knowledge of plant communities, successional relationships, and ecosystem functions with consideration of forest health. Knowledge of these relationships would be used to help prevent vegetation management problems before they occur. Harvest plans would provide for maintenance of long-term site productivity and forest health.

Regeneration harvest units would vary in size, depending on factors such as ownership, topography, and road locations. Appropriate treatment areas would be determined through watershed analysis.

Harvest unit shapes would be irregular, conforming where possible to topographic features, but limited in many cases by logging feasibility and ownership boundaries. An average of 12 to 18 live trees per acre would be reserved from harvest, as clumps, strips, and scattered individual trees. The distribution of reserved trees would be designed to help meet habitat goals and to minimize interference with log yarding.

Partial-cut harvest design

Density management thinnings would generally be designed to encourage rapid development of vertical and horizontal stand diversity. To accomplish this, a stand might be thinned before relative density exceeds 0.55, leaving a residual relative density of approximately 0.35. Patches of denser forest would be retained in some places to meet particular wildlife habitat criteria. Depending on stand age and the specific objectives of thinning, stand density after thinning may range from approximately 50 to 120 trees per acre. Density management areas would vary in size, depending on factors such as operability and site conditions. Appropriate treatment areas would be determined through watershed analysis. A variety of treatment intensities may be designated within a thinning unit in order to reflect current within-stand spatial patterns or to meet stand development objectives.

For example, some dense patches of perhaps one-quarter acre to several acres may be reserved from cutting. Other patches of one-half to one acre may be completely removed as group selections, and those areas planted with tree seedlings after the thinning is completed. Group selection patches larger than one acre in size would contain reserved trees and snags as provided in regeneration harvest units.

In each density management thinning entry, some of the larger codominant and dominant trees would be removed.

Where root diseases such as laminated root rot (*Phellinus weirii*), black stain (*Ceratocystis verticicladiella*) or Port-Orford-cedar root rot (*Phytophthora lateralis*) are present in stands to be thinned, the thinning will incorporate state-of-the-art recommendations for treatment. Openings created will be planted with seedlings of species resistant or immune to the disease, or in a manner to reduce the rate of disease spread.

Late-Successional Reserves

Forest stands less than 80 years of age within most Late-Successional Reserves would be considered for silvicultural treatments where stocking, structure, or composition are expected to prevent or significantly retard development of late-successional conditions. In Late-Successional Reserves within the Northern Coast Range Adaptive Management Area, forest stands up to and including 110 years of age could be considered for silvicultural treatments. Such stands would generally be composed of trees less than 10 to 20 inches diameter at breast height, and would show no significant development of a multiple-canopy forest structure. Stands that have desired late-successional structure or that will soon develop it would not be treated unless such treatment is necessary to accomplish risk-reduction objectives (as described below).

Silvicultural treatments

Density management Density management prescriptions would be designed to produce stand structure and components associated with late-successional conditions, including large trees, snags, logs, and variable-density, multistoried, multispecies stands. By removing a portion of the stand, the remaining trees would be provided room to maintain or increase diameter growth rates. In addition, openings in the canopy would permit development of an understory of seedlings and saplings and other vegetation. Some of the overstory trees may be converted to snags over time, to help meet snag habitat targets, or felled to provide large woody debris. Trees cut but surplus to habitat needs would be removed for commercial use.

A wide variety of silvicultural practices would be employed, rather than relying on a limited variety of techniques. Silvicultural activities would be conducted in suitable stands, whether the action would generate a commercial return or not.

In general, manipulated acreage would be limited to five percent of the total area in any Late-Successional Reserve in the initial five-year period of implementation unless the need for larger-scale actions is explicitly justified.

Reduction of large-scale disturbance risk

In some areas, stands would be made less susceptible to natural disturbances by focusing salvage activities on reduction of catastrophic insect, disease, and wildfire threats, and by designing treatments to provide effective fuel breaks wherever possible. These treatments would be designed so that they would not result in degeneration of currently suitable spotted owl habitat or other late-successional conditions.

Treatments would be implemented to reduce risk in older stands if the proposed management activity would clearly result in greater assurance of long-term maintenance of habitat; is clearly needed to reduce risks; and would not prevent Late-Successional Reserves from playing an effective role in attaining the objectives for which they were established.

Unless exempted from review, proposed risk reduction projects would be submitted to the Regional Ecosystem Office.

Riparian Reserves

Some stands within Riparian Reserves would be considered for silvicultural treatments if they do not prevent or retard attainment of Aquatic Conservation Strategy objectives. Watershed analysis would be completed prior to any treatments.

Density management Where portions of young, even-aged conifer plantations are located within the Riparian reserves, these stands would be considered for density management treatments. The objectives of such treatment would be to promote development of large conifers and to improve diversity of species composition and stand density. Merchantable logs would be removed only where such action would not be detrimental to the purposes for which the Riparian Reserves were established.

Conifer underplanting Where hardwood stands dominate streamside areas and there is a lack of large conifers to provide inputs of large wood for instream structure, efforts would be made to reestablish scattered conifers within the Riparian Reserve. This would involve cutting or girdling some hardwoods to create openings in the canopy, followed by cutting of brush and planting of a variety of conifer seedlings in the openings created. In most cases, followup stand maintenance treatments would be necessary to ensure successful establishment of an adequate number of conifers in the riparian area.

Appendix L

The Forest Genetics Program

Introduction

For thousands of years and for a number of beneficial uses, humans have selected from the genetic variation that is naturally present in plants and animals. Modern agricultural programs have increased yields and productivity through selection and breeding. The need for food production and natural resources is increasing as the human population grows. Genetics programs will continue to help meet these demands.

The genes in all organisms are the basis of their diversity. Genetic diversity is a key component of ecosystems. Broad genetic variability provides a buffer against change. Genetic uniformity decreases resilience to change and increases the potential for problems caused by pests and diseases. The physical characteristics of an organism result from the interaction of its genes with the environment. Ecosystems are dynamic communities that change over time. Species with wide tolerances can adapt to changes, while those with narrow tolerances can be heavily impacted. Genetic material from wild stock is an important source of variability that can be infused into existing improved varieties. Many medicinal compounds are derived from plants and there is the potential for more undiscovered uses. Conserving genetic diversity for all species allows evolutionary processes to continue within the conditions of the natural environment.

Tree improvement is the application of genetic principles and methods to the culture of forest tree species. Many desirable traits in trees can be enhanced with tree improvement. The BLM has participated in cooperative tree improvement programs for forest trees in the Pacific Northwest since the late 1950s. The emphasis has been in improvement of tree growth and disease resistance. Ecosystem management principles are changing the focus of the tree improvement program. The existing tree improvement and seed orchard programs will be integrated into a broader based forest genetics program. A forest genetics program is consistent with ecosystem management principles and can be expanded to cover the genetics of other plants and animals.

The remainder of this appendix describes the objectives, the present status, and the proposed direction of the forest genetics program. Readers interested in technical details of the program are referred to the *BLM Western Oregon Tree Improvement Plan* (U.S. Department of the Interior, BLM, OSO 1987a). Additional information on genetic resource issues can be found in *The Value of Genetic Resources* (Oldfield 1984) and *Genetics and Conservation of Rare Plants* (Falk and Holsinger 1991).

Program Objectives

Objectives of the forest genetics program underlay a broad spectrum of land management activities. The biological foundation of ecosystem management rests upon a clear understanding of the genetic diversity present within the system. The following objectives are broadly defined and include tree improvement, gene management, and gene conservation activities:

- provide seed production for planting species on BLM-administered lands and develop seed collection and seed deployment guidelines;
- develop genetically improved materials to meet BLM's resource management objectives;
- maintain and restore the genetic diversity within managed forest stands;
- analyze needs and carry out gene conservation strategies;
- collect information on genetic variation from important species;
- contribute to the development of genetic information needed for watershed analysis, ecological assessments, research studies and ecosystem management projects; and
- maintain flexibility within the program so that information meets current needs and anticipates future needs.

Status of Existing Program

The BLM tree improvement program has generated a substantial and important genetic information base for several conifer species. The data is significant to ecosystem management because it describes the nature and extent of genetic variation present for selected traits of each species.

Genetic diversity is continuous across the landscape and tree improvement programs are implemented at this level. Each program is focused on a small ecologically similar area called a breeding unit. Most tree improvement programs are cooperatives involving BLM and other forest land owners. A cooperative structure is beneficial because it increases the number of trees in the genetic base and the trees are located across a broader geographic area. Program costs are shared among cooperators which is more efficient. BLM is cooperating in more than fifty breeding units which include several million acres of forest land in Western Oregon.

The following accomplishments summarize the status of the program:

- Several conifer species (Douglas-fir, western hemlock, noble fir, western white pine, and sugar pine) have been selected for genetically controlled characteristics such as growth rate, tree form and resistance to disease;
- Test plantations have been established using progeny of the selected trees. Tree growth on these progeny test sites has been measured at regular intervals;
- Seed orchards have been established using parent trees and are producing locally adapted seed for conifer species including Douglas-fir, western hemlock, noble fir, western red cedar, ponderosa pine, grand fir, and incense cedar;
- Each year improved seed has been sown for replanting a portion of harvested forest acres;
- Seed orchards are managed for seed production, including stimulation techniques to encourage cone production and removal of trees representing progeny that demonstrate slow growth in field tests or show undesirable characteristics (this practice is known as "roguing");
- Second generation programs have been initiated in some breeding units with selection and breeding work underway; and
- Facilities for cone and seed processing and greenhouses for growing custom tailored lots of many species have been established at the seed orchards.

Proposed Program Direction

The future forest genetics program will be more complex under ecosystem management than under the previous management plans. Improvement of growth and disease resistance will continue as important components of the forest genetics program. Gene conservation and gene resources management issues will receive more emphasis. Gene conservation refers to specific actions taken to conserve the genetic variation of species. The purpose is to maintain the range of natural genetic diversity within the species. Gene management refers to the integration of genetic principles into resource management actions.

The following is a summary of future direction for the forest genetics program:

- progeny test sites will be maintained, measurements of growth and other characteristics will continue, and long-term management plans for the sites will be developed;
- seed orchards will be maintained and managed to produce seed for ecosystem management projects;
- improved stock will be planted on a portion of harvested acres;
- tree improvement programs, which have emphasized cooperative efforts for operational programs and research studies with state, private, and other government agencies, will continue;
- genetic expertise and genetically appropriate guidelines will be provided for development of ecosystem management projects; and
- a forest genetics plan will be prepared, including strategies for gene conservation, maintenance of genetic diversity, and definition of monitoring baselines to quantify existing genetic variation within individual species.

Ecosystem management concepts have challenged the forest genetics program with more issues than were faced in previous forest management plans. The former tree improvement program must be meshed with the additional needs defined by ecosystem management so that previous gains are maintained and future needs are addressed. Because policy and land use allocations are likely to change over time, a flexible, broad-based forest genetics program will be an essential tool to accommodate changing conditions.

Appendix M

Proposed Restrictions on Mineral and Energy Exploration and Development Activity

Introduction

This appendix discusses the oil and gas leasing program and stipulations which would be applied to BLM-administered lands as appropriate under the proposed resource management plan. Operating standards pertinent to locatable and salable minerals are also described. Mineral exploration and development on federal lands must also comply with laws and regulations administered by several agencies of the state of Oregon.

Leasable Mineral Resources

Geothermal and Coal

See chapter 2, Energy and Minerals.

Oil and Gas

The Mineral Leasing Act of 1920 (as amended) provides that all publicly owned oil and gas resources be open to leasing unless a specific land order has been issued to close the area. Through the land use planning process, the availability of these resources for leasing is analyzed, taking into consideration development potential and surface resources. Constraints on oil and gas operations are identified and placed in the leases as notices and stipulations. Oil and gas leases are then issued from the BLM Oregon State Office in Portland. Specific proposed notices and stipulations are listed by alternative in a subsequent section of this appendix.

The issuance of a lease conveys to the lessee an authorization to actively explore and/or develop the lease. This must be done in accordance with the attached stipulations and the standard terms outlined in the Federal Onshore Oil and Gas Leasing Reform Act, as amended. Restrictions on oil and gas activities in the planning area would take the form of timing limitations, controlled surface use, or no surface occupancy stipulations. These would be used at the discretion of the BLM authorized officer to protect identified surface resources of special concern.

Stipulations would be attached to each lease, before it is offered for sale, by the office which reviews the lease tract. The review would be conducted by consulting the direction given in this resource management plan. In addition, all lands administered by the BLM within the planning area would be subject to the lease notices as shown on the following pages. Every attempt would be made to place stipulations in the lease and to minimize use of Standard Conditions of Approval attached to the site-specific permit. All federal lessees or operators are required to follow procedures set forth by Onshore Oil and Gas Orders, notice to lease, Federal Onshore Oil and Gas Leasing Reform Act, and title 43 Code of Federal Regulations, part 3100.

Geophysical Explorations

Geophysical operations may be conducted regardless of whether or not the land is leased. Notices to conduct geophysical operations on BLM surface are received by a resource area. Administration and surface protection are accomplished through close cooperation of the operator and the BLM. Seasonal restrictions may be imposed to reduce fire hazards, conflicts with wildlife, watershed damage, etc. An operator is required to file a Notice of Intent to Conduct Oil and Gas Exploration Operations for all geophysical activities on public land administered by

the BLM. The notice should adequately show the location and access routes, anticipated surface damages, and time frame. The operator must be bonded, and required to comply with written instructions and orders given by the authorized officer. Signing of a notice of intent by the operator signifies agreement to comply with the terms and conditions of the notice, regulations, and other requirements prescribed by the authorized officer. A prework conference and/or site inspection may be required. Periodic checks during and upon completion of the operations would be conducted to ensure compliance with the terms of notice of intent, including reclamation.

Drilling Permit Process

The federal lessee or operating company selects a drill site based on spacing requirements, subsurface and surface geology, geophysics, topography, and economic considerations. Well spacing is determined by the authorized officer after considering topography, reservoir characteristics, protection of correlative rights, potential for well interference, interference with multiple use of lands, and protection of the surface and subsurface environments. Close coordination with the state would take place. Written field spacing orders are issued for each field. Exceptions to spacing requirements involving federal lands may be granted after joint state and BLM review.

Notice of Staking

Once the company makes the decision to drill, they must decide whether to submit a notice of staking or apply directly for a permit to drill. The notice of staking is an outline of what the company intends to do. It includes a location map and sketched site plan. The notice of staking is used to review any conflicts with known critical resource values and to identify the need for associated rights-of-way and special use permits. The BLM utilizes information contained in the notice of staking and obtained from the onsite inspection to develop stipulations to be incorporated into the application for permit to drill. Upon receipt of the notice of staking, the BLM posts the document and pertinent information about the proposed well in the district office for a minimum of 30 days prior to approval, for review and comment by the public.

Application for Permit to Drill

The operator may or may not choose to submit a notice of staking. In either case, an application for permit to drill must be submitted prior to drilling. An application for permit to drill consists of two main parts:

- A 12-point surface plan which describes any surface disturbances. This is reviewed by resource specialists for adequacy with regard to lease stipulations designed to mitigate impacts to identified resource conflicts with the specific proposal; and
- An 8-point subsurface plan which details the drilling program. It is reviewed by the staff petroleum engineer and geologist. This plan includes provisions for casing, cementing, well control, and other safety requirements. For the application for permit to drill option, the onsite inspection is used to assess possible impact and develop stipulations to minimize these impacts. If the notice of staking option is not utilized, the 30-day posting period begins with the filing of the application for permit to drill. Private surface owner input is actively solicited during the application for permit to drill stage.

Leasing Stipulations and Notices

Resources to be protected through leasing stipulations and notices are listed below and described in the narrative following the list.

Open - Standard Stipulations

Open - Powersite Stipulation

Open - No Surface Occupancy Stipulations

- Wild and scenic rivers (designated and found suitable for designation)
- Recreation sites (existing and potential)
- Recreation and Public Purposes and Federal Land Policy and Management Act Leases

- Forest disease research and study sites
- Special areas (proposed)
- Progeny test sites
- Horning Seed Orchard
- Visual resource management class I areas
- Riparian reserves
- Great blue heron rookeries
- Osprey nest sites

Open - Controlled Surface Use Stipulations

- Late-successional reserves and district-designated reserve
- Connectivity/diversity blocks
- Visual resource management class II areas
- Steep slopes (over 60 percent)
- Special recreation management areas
- Managed rural interface areas
- Eligible wild and scenic river segments (except those found not suitable through this proposed resource management plan)

Open - Timing Limitations

- Raptor nests

Notice

- Cultural resources

Less restrictive actions were considered during the planning process, but were found inadequate to protect known or suspected special values.

Stipulations may include waivers, exceptions, and modifications, defined generally as follows:

- Waiver. The lifting of a stipulation from a lease that constitutes a permanent revocation of the stipulation from that time forward. The stipulation no longer applies anywhere within the leasehold.
- Exception. This is a one time lifting of a stipulation to allow an activity for a specific proposal. This is a case-by-case exception. The stipulation continues to apply to all other sites within the leasehold to which restrictive criteria apply. It has no permanent effect on the lease stipulation.
- Modification. This is a change to a stipulation that either temporarily suspends the stipulation requirement or permanently lifts the application of the stipulation on a given portion of the lease. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria apply.

Lease notices are attached to leases in the same manner as stipulations. However, there is an important distinction between lease notices and stipulations. Lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice are fully supported in laws, regulations, policy, or onshore oil and gas orders.

Open - Standard Stipulations

Standard stipulations for oil and gas are listed in section 6, form 3100-11, Offer to Lease and Lease for Oil and Gas. They are:

- Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air and water, to cultural, biological, visual and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with

lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned to prevent unnecessary or unreasonable interference with rights of the lessee.

- Prior to disturbing the surface of the leased lands, lessee shall contact the BLM to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects until appropriate steps have been taken to protect the site or recover the resources as determined by the BLM in consultation with other appropriate agencies.

Open - Powersite Stipulations (form No. 3730-1): to be used on all lands within powersite reservations.

Open - No Surface Occupancy Stipulations

Resource: Wild and scenic rivers (designated and found suitable for designation)

Stipulation: Surface occupancy is prohibited within the _____ wild and scenic river corridor. Existing roads and trails may be used if such use does not prevent or retard attainment of Aquatic Conservation Strategy objectives.

Objective: protect outstandingly remarkable values.

Resource: Recreation sites

Stipulation: Surface occupancy and use are prohibited within _____ recreation site.

Objective: protect developed and potential recreation sites and visitor experiences.

Resource: Recreation and Public Purposes and Federal Land Policy and Management Act Leases

Stipulation: Surface occupancy and use are prohibited on the _____ Recreation and Public Purposes (or Federal Land Policy and Management Act) lease.

Objective: protect public uses on existing Recreation and Public Purposes or Federal Land Policy and Management Act leases and the investments of leaseholders.

Resource: Forest disease research and study sites

Stipulation: Surface occupancy and use are prohibited within _____ forest disease research (or study) site.

Objective: protect BLM investments in research or study sites.

Resource: Special areas

Stipulation: Surface occupancy and use are prohibited within _____ special area.

Objective: protect important historic, cultural, scenic values, natural resources, natural systems or processes, threatened and endangered plant species, and/or natural hazard areas of the special areas.

Resource: Progeny test sites

Stipulation: Surface occupancy and use are prohibited within _____ progeny test site.

Objective: protect the BLM investment in progeny test sites.

Resource: Horning Seed Orchard

Stipulation: Surface occupancy and use are prohibited within the Horning Seed Orchard.

Objective: protect the BLM investment in the Horning Seed Orchard.

Resource: Visual resource management class I areas

Stipulation: Surface occupancy and use are prohibited in visual resource management class I areas.

Objective: preserve the existing character of the landscape.

Resource: Riparian reserves

Stipulation: Surface occupancy and use are prohibited within riparian reserves.

Objective: protect water quality and riparian vegetation.

Resource: Great blue heron rookeries

Stipulation: Surface occupancy and use are prohibited within _____ feet of known great blue heron rookeries.

Objective: protect known great blue heron rookeries.

Resource: Osprey nest sites

Stipulation: Surface occupancy and use are prohibited within _____ feet of known osprey nest sites which have been active within the past seven years.

Objective: protect osprey nest sites.

Open - Controlled Surface Use Stipulations

Resource: Late-successional reserves and district-designated reserve

Stipulation: Unless otherwise authorized, drill site construction and access through late-successional reserves (district-designated reserve) within the leasehold will be limited to established roadways.

Objective: protect late-successional forest stands and plant and animal species dependent on late-successional forest.

Resource: Connectivity/Diversity Blocks

Stipulation: Unless otherwise authorized, drill site construction and access through connectivity/diversity blocks will be limited to established roadways.

Objective: protect late-successional forest stands and plant and animal species dependent on late-successional forest.

Resource: Visual resource management class II areas

Stipulation: All surface-disturbing activities, semipermanent and permanent facilities in visual resource management class II areas may require special design including location, painting and camouflage to blend with the natural surroundings and meet the visual quality objectives for the area.

Objective: keep the visual impacts of leasing activities and facilities within acceptable levels.

Resource: Steep slopes

Stipulation: Prior to disturbance of slopes over 60 percent, an engineering/reclamation plan must be approved by the authorized officer. Such plan must demonstrate how the following would be accomplished:

- restoration of site productivity;
- control of surface runoff;
- protection of offsite areas from accelerated erosion, such as rilling, gullyng, piping, and mass wasting; and
- conformance with state and federal water quality laws.

Objective: maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, and avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems.

Resource: Special recreation management areas

Stipulation: Unless otherwise authorized, drill site construction and access through _____ special recreation management area will be limited to designated roadways. All surface-disturbing activities, semipermanent and permanent facilities may require special design including location, painting and camouflage to blend with the natural surroundings and meet the visual quality objectives for the area.

Objective: protect recreational qualities of areas and facilities and enhance recreational opportunities within the designated boundaries of special recreation management areas.

Resource: Managed rural interface areas

Stipulation: Unless otherwise authorized, drill site construction and access through the managed rural interface area(s) in _____ (legal description) will be limited to designated roadways.

Objective: minimize conflicts with people living in rural interface areas.

Resource: Eligible wild and scenic river segments

Stipulation: Unless otherwise authorized, drill site construction and access through the _____ eligible wild and scenic river corridor will be limited to designated roadways.

Objective: protect outstandingly remarkable values until final determinations are made for these river segments.

Open - Timing Limitations

Resource: Raptor nests

Stipulation: surface use is prohibited from _____ (dates), within _____ (distance) of raptor nest sites which have been active within the past two years. This stipulation does not apply to the operation and maintenance of production facilities.

Objective: protect nest sites of raptors which have been identified as species of special concern in Oregon.

Notice

Resource: Cultural resources

- Notice: An inventory of the leased lands may be required prior to surface disturbance to determine if cultural resources are present and to identify needed mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator shall:
- Contact the BLM to determine if a cultural resource inventory is required. If an inventory is required, the BLM will complete the required inventory or the lessee or operator, at their option, may engage the services of a cultural resource consultant acceptable to the BLM to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the standard ten-acre minimum to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the BLM for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted.
- Implement mitigation measures required by the BLM. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as data recovery and extensive recordation. Where impacts to cultural resources cannot be mitigated to the satisfaction of the surface management agency, surface occupancy on that area must be prohibited. The lessee or operator shall immediately bring to the attention of the BLM any cultural resources discovered as a result of approved operations under this lease, and shall not disturb such discoveries until directed to proceed by the BLM.

- Authorities: Compliance with section 106 of the National Historic Preservation Act is required for all actions which may affect cultural properties eligible to the National Register of Historic Places. Section 6 of the Oil and Gas Lease Terms (form 3100-11) requires that operations be conducted in a manner that minimizes adverse impacts to cultural and other resources.

Locatable Minerals Surface Management Standards for Exploration, Mining, and Reclamation

The following operational guidelines for mining activities have been compiled to facilitate compliance with the 43 Code of Federal Regulations 3809 surface management regulations, which apply to all mining operations on BLM-administered lands in the Salem District. All of the following standards may not apply to every mining operation. The BLM will provide site specific standards for some mining proposals. It is the mining claimant's and/or operator's responsibility to avoid "unnecessary or undue degradation," and to promptly perform all necessary reclamation work. Refer to the regulations at 43 Code of Federal Regulations 3809 for general requirements. BLM's *Solid Mineral Reclamation Handbook (H-3042-1)* provides guidance for the reclamation of mining and exploration sites that will be followed on the Salem District.

There is an intergovernmental agreement between BLM and the Oregon Department of Geology and Mineral Industries designed to avoid duplication of regulations, inspections, and approval of reclamation plans as well as minimize repetitive costs to mining operators. The following guidelines include some but not all of the requirements of the various state agencies overseeing mining operations. BLM does not enforce state requirements and they are included here as information. State requirements could change during the plan period.

Prospecting, Exploration, and Mining

Surface Disturbance

BLM Requirements Operations ordinarily resulting in only negligible disturbance as defined in 43 Code of Federal Regulations 3809.0-5(b) are considered to be "casual use" and no notification to or approval by the BLM is required. Casual use activities include staking mining claims, prospecting or sampling or mining with hand tools, gold panning, and use of suction dredges with a suction hose equal to or less than 4 inches in diameter where no structures or occupancy beyond 14 calendar days per year is involved.

All operators proposing occupancy for more than 14 calendar days per year, timber removal, road or trail construction, installation of structures of any kind, suction dredges with suction hoses having an inside diameter of greater than 4 inches, multiple suction dredges regardless of size, or the use of other mechanized earth moving equipment which would cause a surface disturbance of five acres or less during any calendar year, must provide written notice to the district office at least 15 days prior to the commencement of any surface mining disturbance. For operations that will cause greater than five acres of cumulative surface disturbance, the operator is required to submit a Plan of Operations pursuant to the regulations in 43 Code of Federal Regulations 3809.1-4. Generally, the need for a Notice or Plan of Operations is determined on a case-by-case basis.

State of Oregon Requirements Out-of-stream mining, which disposes of all waste water by evaporation and/or seepage with no readily-traceable discharge to ground water or surface water, and involves processing of up to 10,000 cubic yards of material per year, must be authorized under General Permit #0600 issued by the Department of Environmental Quality.

All suction dredge operations must be authorized by Permit #0700-J issued by the Department of Environmental Quality. This permit is issued free of charge for dredges having hoses with an inside diameter of 4 inches or less. Registration and a filing fee of \$50.00 is required for suction dredges having hoses with an inside diameter

greater than 4 inches. Mining operators should contact the Department of Environmental Quality, 750 Front Street N.E., Suite 120, Salem, Oregon 97310, phone: 378-8240 extension 238, for further information.

Suction dredging outside the "permitted work period" established for certain waterways by the Oregon Department of Fish and Wildlife (ODFW) will require written permission by an appropriate ODFW district biologist.

The river beds of navigable waterways are controlled by the Oregon Division of State Lands.

Removal or alteration of over 50 cubic yards of material in any waters of the state requires a Removal-Fill permit from the Division of State Lands. This permit is required for any relocation of flowing streams in conjunction with mining.

Any person engaging in onshore mineral exploration, which disturbs more than one surface acre or involves drilling to greater than 50 feet, must obtain an exploration permit from the Oregon Department of Geology and Mineral Industries (DOGAMI). Mining operations involving 5,000 or more cubic yards of material per year or disturbance of one or more acres of land will require an operating permit from DOGAMI.

Timber Removal The operator may cut and use timber that is in the way of mining activities. An application must be submitted to the authorized officer pursuant to 43 Code of Federal Regulations 3821.4 describing the proposed use of merchantable timber from Oregon and California lands for mining purposes. No merchantable trees may be cut until the application is approved and the trees are marked.

The Salem BLM office recommends that small trees less than 7 inches in diameter at breast height (dbh) and shrubs be lopped and scattered, or shredded for use as mulch. Trees greater than or equal to 7 inches dbh are to be bucked and stacked in an accessible location unless they are needed for the mining operation.

Firewood Merchantable conifer timber may not be used for firewood. Firewood permits may be issued to the operator for use in conjunction with the mining operation, but no wood may be used until a permit is obtained from BLM. Permits will be limited to hardwoods or salvage timber that is not considered merchantable. Firewood authorized for use in conjunction with a mining operation is not to be removed from the mining claim.

Topsoil Topsoil and usable subsoil (usually the top 12 to 18 inches) should be carefully removed from all areas in advance of excavation or establishment of mine waste dumps and tailings dams. This material should be stockpiled and protected from erosion for use in future reclamation.

Roads Existing roads and trails should be used as much as possible. Temporary roads are to be constructed to a minimum width and with minimum cuts and fills. All roads shall be constructed so as not to negatively impact slope stability. Roads will be promptly reclaimed when no longer needed.

Wetlands When proposed mining activities will fill or alter wetland areas, the operator must contact the Department of the Army, Corps of Engineers, for the appropriate permit. A copy of the permit must be submitted to the authorized officer in conjunction with a Notice or Plan of Operations.

Water Quality All operators shall comply with federal and state water quality standards including the federal Water Pollution Control Act. When mining will be in or near bodies of water, or sediment will be discharged, the Oregon Department of Environmental Quality (DEQ) should be consulted. A discharge permit is required when mining operations discharge turbid water. In some cases, a settling pond may be necessary. It is the operator's responsibility to obtain any needed suction dredging, stream bed alteration, or water discharge permits required by DEQ or other state agencies. Copies of such permits shall be provided to the BLM authorized officer when a Notice or Plan of Operations is filed. All operations, including casual use, shall be conducted in a manner so as to prevent unnecessary or undue degradation of surface and subsurface water resources and shall comply with all pertinent federal and state water quality laws.

Claim Monuments State law prohibited the use of plastic pipe for lode claim staking in Oregon after House Bill 2077 was implemented on March 28, 1991. BLM policy requires that existing plastic pipe monuments should have all openings (ends and slots) permanently closed. Upon loss or abandonment of the claim, all plastic pipe must be removed from the public lands. When old markers are replaced during normal claim maintenance, they are to be either wood posts or stone and/or earth mounds, constructed in accordance with state law.

Drill Sites Whenever possible, exploratory drill sites should be located next to or on existing roads without blocking public access. When drill sites must be constructed, the size of the disturbance shall be as small as possible. Any operator engaging in mineral exploration that involves drilling to greater than 50 feet must obtain an exploration permit from the Oregon Department of Geology and Mineral Industries (ORS 517.962).

Dust and Erosion Control While in operation, and during periods of shut-down, exposed ground surfaces susceptible to erosion will need to be protected. This can be accomplished with seeding, mulching, installation of water diversions, and routine watering of dust producing surfaces.

Fire Safety All state fire regulations must be followed, including obtaining a campfire permit or blasting permit, if needed. All internal gas combustion engines must be equipped with approved spark arresters and exhaust systems.

Safety and Public Access Under Public Law 167, the government has the right to dispose and manage surface resources (including timber) on mining claims located after July 23, 1955. These rights are limited to the extent that they do not endanger or materially interfere with any phase of an ongoing mining operation or uses reasonably incident thereto. Claims located prior to July 23, 1955 may have surface rights, if such claims were verified as being valid under Sections 5 and 6 of the Act.

Mining claimants shall not exclude the public from mining claims with force, intimidation, or no trespassing signs. It is the operator's responsibility to protect the public from mining hazards. The general public can be restricted only from specific dangerous areas (e.g., underground mines, open pits, or equipment storage sites) by erecting fences, gates and warning signs. Gates or road blocks may be installed on existing or proposed roads only with BLM approval. Gates restricting public access onto a mine site will only be considered in cases where there is a large area safety hazard created by the mining activity. The determination as to whether a safety hazard is large enough to warrant a gate will be determined on a case-by-case basis. Fences (rather than gates) or other approved barriers shall be utilized to protect the public from hazards related to small excavations, tunnels, and shafts.

Some roads that cross private land to reach BLM-administered lands are controlled by private parties. Some of these roads have been assigned BLM road numbers, which can give the impression that they are BLM roads. These roads may grant administrative use to the BLM and its licensees and permittees under a nonexclusive easement. Mining claimants are not considered licensees or permittees and, therefore, they must make their own arrangements with the private party in order to use such a road. No automatic right is granted under any of the mining laws to use a road involved in a nonexclusive easement.

Sewage Self-contained or chemical toilets are to be used at exploration or mining operations and their contents disposed of at approved dump stations. Outhouses and uncontained pit toilets are considered unnecessary and undue degradation and are not allowed. Uncontained pit toilets are not allowed for other users of the public land in this district, and we believe no special rights regarding this issue are granted under the mining laws. County sanitation permits are required for all other types of proposed sanitation facilities.

Structures It is district policy that permanent structures will not be allowed for exploration or prospecting operations. Permanent structures are those fixed to the ground by any of the various types of foundations, slabs, piers, poles, or other means allowed by state or county building codes. The term shall also include structures placed on the ground that lack foundations, slabs, piers or poles, and that can only be moved through disassembling.

bly into component parts or by techniques commonly used in house moving. Permanent structures include trailers, mobile homes, motor homes, campers, house-cars, and the like when fixed to the ground by any method.

Any temporary structures placed on public lands in conjunction with prospecting or exploration are allowed only for the duration of such activities, unless expressly allowed in writing by the authorized officer to remain on the public lands. Temporary structures are defined as structures not fixed to the ground by a foundation or piers (cinder blocks or posts) and that can be moved without disassembly into its component parts. Vans, pickup campers, motor homes, and trailers that have not been piersed are considered to be temporary structures.

Permanent structures (as described above) may be allowed for mining operations if they are deemed reasonably incident to conducting the operation. Mining operations are defined as all functions, work, facilities, and activities in connection with development, mining, or processing mineral deposits.

All permanent or temporary structures placed on public lands shall conform with the appropriate state or local building, fire, and electrical codes, and occupational safety and health and mine safety standards. This requirement for existing or future structures on BLM lands in Oregon was published in the Federal Register on July 1, 1992. BLM may require operators to remove such structures if a period of non-operation exceeds 24 consecutive months, and reclamation of the building site(s) must be conducted at that time.

Equipment Only equipment and supplies that are appropriate, reasonable, and in regular use for exploration and mining operations will be allowed on the mining claim. Equipment used only infrequently (including parts and scrap metal) should be stored off site. That which can be readily removed in a small truck and/or trailer at the end of the work day should not be left on site. Storage of unused or infrequently used equipment will not serve to justify occupancy of a mining claim. Accumulation of unused and/or derelict equipment and other unused materials, including trash, may be in violation of federal and state ordinances regarding offensive littering, and will be considered undue and unnecessary degradation of the public lands. BLM may require the operator to remove equipment after an extended period (defined as 24 consecutive months) of non-operation and to reclaim the site. In such cases, the claimant will be required to take immediate mitigative action.

Animals If dogs or cats are to be present at the work site, the operator is required to keep them under control at all times so that they do not chase wildlife, or threaten other people, including government employees conducting site inspections on the public lands. Unless otherwise permitted, animals such as cows, chickens, goats, pigs, or horses are not considered necessary to conduct mining operations and are not allowed on mining claims.

Tailings Ponds Settling ponds must be used to contain sediment, and any discharge must meet the standards of the Oregon Department of Environmental Quality.

Solid and Hazardous Waste Trash, garbage, used oil, etc. must be removed from public land and disposed of properly. Trash, garbage or hazardous wastes must not be buried on public lands. Accumulations of trash, debris, or inoperable equipment on public lands is viewed as unnecessary degradation and will not be tolerated. Operators conducting illegal disposals shall be held financially responsible for the clean-up of such disposals.

Cultural and Paleontological Resources Operators shall not knowingly alter, injure, or destroy any scientifically important paleontological (fossil) remains or any historical or archaeological site, structure, or object on federal lands. The operator shall immediately bring to the attention of the BLM, any paleontological (fossil) remains or any historical or archaeological site, structure, or object that might be altered or destroyed by exploration or mining operations, and shall leave such discovery intact until told to proceed by the authorized officer. The authorized officer shall evaluate the discovery, take action to protect or remove the resource, and allow operations to proceed within 10 working days.

Threatened and Endangered Species of Plants and Animals Operators shall take such action as may be needed to prevent adverse impacts to threatened or endangered species of plants and animals and their habitat that may be affected by operations, as stipulated in guidelines developed through consultation with the U.S. Fish and Wildlife Service. Under Notice-level operations, if the review of the notice by BLM reveals that a potential conflict with a threatened or endangered species exists, the operator will be advised not to proceed and informed that a knowing violation of the taking provision of the Endangered Species Act will result in a notice of noncompliance and may result in criminal penalties. If the operator wishes to develop measures that will eliminate the conflict, then the authorized officer will arrange for the participation of BLM resource specialists and the U.S. Fish and Wildlife Service in reviewing the proposed revision to the Notice. If processing a proposed Plan of Operations indicates that a potential conflict exists with a threatened or endangered species or its habitat, the authorized officer shall notify the operator that the plan cannot be approved until BLM has complied with Section 7 of the Endangered Species Act. Special status species (Federal Candidate/ Bureau Sensitive) plants and animals, and their habitat will be identified by the authorized officer, and shall be avoided wherever possible.

Occupancy at Mining Sites

Living on public land in excess of 14 days per calendar year must be reasonably incident to and required for actual continuous mining or diligent exploration operations and will require either a Notice or Plan of Operations. In general, operations at the casual use level are not sufficient to warrant occupancy on a mining claim. The following discussion of occupancy only applies to those operators wishing to assert their right to live full-time on public lands pursuant to privileges granted under the mining laws.

- Any claimant and/or operator who will occupy a claim will identify in the Notice or Plan of Operations, immediate family members (spouse, minor children/stepchildren) who will be living on the mining claim. The claimant and/or operator will be required to be engaged in a good faith, diligent effort in prospecting, exploration, mining, or processing operations to warrant occupancy. The immediate family members, as defined above, will be allowed to occupy the site without engaging in the mining-related work which is being conducted by the claimant or operator.
- The claimant and/or operator will be required to notify the Salem District Office in writing if any additional individuals not identified in the original Notice or Plan of Operations propose to stay on the claim longer than 14 calendar days. Based on a case-by-case review, occupancy by such individuals will be allowed if it is reasonably incident to conducting diligent mining-related activities. In such instances, the Notice or Plan of Operations would be amended to note additional workers allowed to live on the site.

In some cases, it may be reasonably incident for a security guard to live on-site in order to protect valuable property, equipment, and/or safeguard the public from workings that are necessary for the mining operation. The need for a security guard shall be such that the person with those duties is required to be present at the site whenever the operation is shut down temporarily or at the end of the workday, or whenever the mining claimant, operator, or workers are not present on the site. The proposed occupancy by a security guard must be described in the Notice or Plan of Operations. If a guard animal is kept at the site, it must be kept under control at all times, or could be considered a public safety hazard.

Reclamation

Reclamation of all disturbed areas must be performed concurrently or as soon as possible after exploration or mining permanently ceases and shall conform to guidelines described in BLM Handbook H-3042-1. Reclamation shall include, but shall not be limited to:

- saving topsoil for final application after reshaping disturbed areas;
- measures to control erosion, landslides, and water runoff;
- measures to isolate, remove or control toxic materials;
- reshaping the area disturbed, applying topsoil, and revegetating disturbed areas where reasonably practicable; and
- rehabilitation of fisheries and wildlife habitat.

When reclamation of the disturbed area has been completed, except to the extent necessary to preserve evidence of mineralization, the BLM must be notified so that an inspection of the area can be made.

Equipment and Debris All mining equipment, vehicles, and structures must be removed from the public lands during periods of nonoperation in excess of 24 consecutive months and/or at the conclusion of mining, unless authorization from BLM is given to the operator or claimant in writing. Accumulations of debris and trash on mining claims is considered unnecessary and undue degradation and must be removed immediately regardless of the status of the operation. Failure to do so will result in the issuance of a notice of noncompliance.

Backfilling and Recontouring The first steps in reclaiming a disturbed site are backfilling excavations and reducing high walls, if feasible. Coarse rock material should be replaced first, followed by medium sized material, with fine materials to be placed on top. Recontouring means shaping the disturbed area so that it will blend in with the surrounding lands, minimize the possibility of erosion, and facilitate revegetation.

Seedbed Preparation Recontouring should include preparation of an adequate seedbed. This is accomplished by ripping or disking compacted soils to a depth of at least 6 inches in rocky areas and at least 18 inches in less rocky areas. This should be done following the contour of the land to limit erosion. All stockpiled settling pond fines, and then topsoil, shall be spread evenly over the disturbed areas.

Fertilizer Due to the generally poor nutrient value of mined soils, it may be necessary to use fertilizer to ensure maximum yield from the seeding mixture. For example, a fertilizer with analysis of (16-16-16, or other approved mix) should be spread at the rate of 200 pounds per acre, but not allowed to enter streams or bodies of water.

Seeding BLM-approved seeding prescription must be used to provide adequate revegetation for erosion control, restoration of wildlife habitat, and achieve productive secondary uses of public lands. Seeding should be done in September or October in the Salem District to ensure that seed is in the ground prior to the first significant winter rains. If seeding fails, or is done at the wrong time, the operator may be asked to reseed the area at the appropriate time, as determined by the authorized officer.

Broadcast seeding is preferable on smaller sites. When using a whirlybird type seed spreader, it is important to keep the different seeds well mixed to achieve even seed distribution. For the best results, a drag harrow should be pulled over the seeded area to cover the seed before mulching. The authorized officer may recommend hydroseeding on critical sites for rapid coverage and erosion control on cut banks, fill slopes, and any other disturbed areas.

Tree Replacement Replacement of destroyed trees may be necessary with the planting of seedlings or container stock.

Mulch As directed by the BLM, during review of the Notice or Plan of Operations, the disturbed area may require mulching during interim or final reclamation procedures. Depending on site conditions, the mulch may need to be punched, netted, or blown on with a tackifier to hold it in place. In some cases, erosion control blankets may be cost effective for use.

Roads After mining is completed, all new roads shall be reclaimed, unless otherwise specified by the BLM. High walls and cutbanks are to be knocked down or backfilled to blend with the surrounding landscape. Remove all culverts from drainage crossings and cut back the fill to the original channel. The roadbed should be ripped to a minimum depth of 18 inches to reduce compaction and provide a good seedbed. The road must then be fertilized, seeded and mulched if necessary. When necessary, water bars are to be used to block access and provide drainage.

Tailings Ponds The ponds should be allowed to dry out and the sediments removed and spread with the topsoil, unless the sediments contain toxic materials. If the ponds contain toxic materials, a plan will be developed to identify, dispose, and mitigate effects of the toxic materials. If necessary, a monitoring plan will also be implemented. The ponds should then be backfilled and reclaimed.

Visual Resources To the extent practicable, the reclaimed landscape should have characteristics that approximate or are compatible with the visual quality of the adjacent area.

Salable Mineral Resources

Proposed Operations

All proposed salable mineral developments and any exploration that involves surface disturbance would have operation and reclamation plans. They would undergo an appropriate level of review and compliance with National Environmental Policy Act.

Quarry Design

Due to steep terrain in the operating area, most quarry developments will require a series of benches to effectively maximize the amount of mineral materials to be removed in a safe manner. In most cases, bench height should not exceed 40 feet. If the bench will be used by bulldozers to access other parts of the quarry, the width of the bench should be at least 25 feet. If the bench is not used by equipment, then this width can be reduced to approximately 10 feet.

Clearing of timber and brush should be planned at least 10 feet beyond the edge of the excavation limit. Most often the brush will be piled and burned at the site, or scattered nearby.

If possible, all topsoil and overburden should be stockpiled and saved for eventual quarry site reclamation. These piles may need to be stabilized by mulching or seeding in order to minimize erosion during the winter months.

As a standard procedure, the excavation of the quarry floor should be designed with an outslope of approximately two percent to provide for adequate drainage of the floor. Compliance with this design should be made a requirement of all operators at the site.

Operating Procedures

The following requirements should be made a part of every contract or permit providing for the use of mineral material sites on the district:

- Oversized boulders shall not be wasted but shall be broken and utilized concurrently with the excavated material.
- The operator shall comply with local and state safety codes covering quarry operations, warning signs and traffic control. All necessary permits must be obtained from state and county agencies.
- Use of the site for equipment storage and stockpiling rock material is allowed for the duration of the contract or permit. Use of the site beyond that time would be authorized under a special use permit.

Appendix N

Land Tenure Adjustment, Zone 3 Lands

Township	Section	Subdivision	Acres	Status
T. 3 N., R. 1 W.	9	Lot 8	1.24	OT
T. 3 N., R. 8 W.	10	NWNE	40.00	PD
T. 3 N., R. 8 W.	11	Lot 2	.01	PD
T. 3 N., R. 8 W.	18	Lot 2	21.44	PD
T. 5 N., R. 6 W.	6	Lot 9	2.12	PD
T. 5 N., R. 7 W.	10	SWNE	40.00	PD
T. 7 N., R. 4 W.	6	Lot 7	.03	PD
T. 9 N., R. 7 W.	32	Lot 8	.72	PD
T. 1 S., R. 3 W.	7	Lot 1	.18	OC
T. 1 S., R. 3 W.	8	Lot 1	.05	PD
T. 1 S., R. 4 W.	15	SWNE, SNW	120.00	OC
T. 2 S., R. 2 E.	4	Lot 2	.04	PD
T. 2 S., R. 2 E.	9	Lot 7	.11	OT
T. 2 S., R. 3 E.	23	Lots 8, 12	6.25	OC
T. 2 S., R. 3 E.	25	Lots 7, 8	1.69	OC
T. 2 S., R. 3 W.	23	NNE, NENW	120.00	OC
T. 2 S., R. 4 W.	31	Lot 1	1.30	OC
T. 2 S., R. 9 W.	4	M&B	5.30	OT
T. 2 S., R. 9 W.	7	UN Lot	.19	PD
T. 3 S., R. 2 E.	7	Lot 1	.87	OC
T. 3 S., R. 3 E.	1	Lots 11, 14	54.51	OC
T. 3 S., R. 3 E.	7	NESW	40.00	OC
T. 3 S., R. 3 E.	9	Lot 3, NW, WSE	270.40	OC
T. 3 S., R. 3 E.	15	Lot 6, 10-12	45.93	OC
T. 3 S., R. 3 E.	19	NWNE, NENW	80.00	OC
T. 3 S., R. 3 E.	25	Lots 9-11	24.17	OC
T. 3 S., R. 3 E.	27	Lot 7, SENE, SWSE	103.32	OC
T. 3 S., R. 3 E.	29	Lot 4, SESW, WSE	146.65	OC
T. 3 S., R. 3 E.	33	NW	160.00	OC
T. 3 S., R. 3 E.	35	NE, NW	320.00	OC
T. 3 S., R. 4 E.	31	UN Lot, Lot 5	57.66	OC
T. 3 S., R. 4 W.	33	Lot 4	.11	OC
T. 3 S., R. 9 W.	19	NENW	40.00	PD
T. 3 S., R. 9 W.	20	NWNE	40.00	PD
T. 3 S., R. 9 W.	21	SWSW	40.00	PD
T. 3 S., R. 9 W.	28	SWSE	40.00	PD
T. 3 S., R. 9 W.	31	SSE	80.00	PD
T. 3 S., R. 9 W.	33	NWNE	40.00	PD
T. 3 S., R. 10 W.	30	Lot 15	.45	PD
T. 4 S., R. 1 E.	21	Lot 1	.49	OC
T. 4 S., R. 2 E.	11	NENE, SWNE, ESW, NWSE	200.00	OC
T. 4 S., R. 2 E.	15	NWSE, SESE	80.00	OC
T. 4 S., R. 2 E.	23	SWNW	40.00	OC
T. 4 S., R. 2 E.	33	Lots 1, 2	1.80	OC
T. 4 S., R. 3 E.	9	SWNE, NWSE	80.00	OC
T. 4 S., R. 3 E.	19	UN Lot	47.31	OC
T. 4 S., R. 3 E.	21	ENE, SWNW, NSW	200.00	OC
T. 4 S., R. 3 E.	29	ENE	80.00	OC
T. 4 S., R. 3 E.	31	SNE, NWSE	120.00	OC

Land Tenure Adjustment, Zone 3 Lands (continued)

Township	Section	Subdivision	Acres	Status
T. 4 S., R. 1 W.	22	UN Lot	.50	PD
T. 4 S., R. 3 W.	2	Lot 1	.25	PD
T. 4 S., R. 3 W.	26	Lot 14	6.75	PD
T. 4 S., R. 3 W.	34	Lots 1, 2	4.40	PD
T. 4 S., R. 3 W.	35	Lot 13	8.34	OC
T. 4 S., R. 10 W.	19	Lot 1, 15	77.75	PD
T. 4 S., R. 10 W.	28	Lot 3	0.53	PD
T. 5 S., R. 3 W.	4	Lot 1	1.16	PD
T. 5 S., R. 3 W.	11	Lot 1	15.06	OC
T. 5 S., R. 4 W.	27	Lot 1	13.00	OC
T. 5 S., R. 5 W.	13	Lot 3	.05	OC
T. 5 S., R. 5 W.	31	Lot 1	3.57	OC
T. 5 S., R. 5 W.	34	Lot 1	.93	PD
T. 5 S., R. 5 W.	35	Lot 1	8.00	OC
T. 5 S., R. 10 W.	5	UN Lots	2.07	PD
T. 5 S., R. 10 W.	20	SENE	40.00	PD
T. 5 S., R. 10 W.	34	NNE, NENW	120.00	PD
T. 6 S., R. 3 W.	2	Lot 2	.20	PD
T. 6 S., R. 3 W.	5	Lot 1	2.00	OC
T. 6 S., R. 1 E.	13	ENW, SWNW	120.00	OC
T. 6 S., R. 1 E.	25	NWNE, SENW	80.00	OC
T. 6 S., R. 6 W.	35	Lot 1	28.40	OC
T. 6 S., R. 10 W.	20	NESW, NWSE	80.00	PD
T. 6 S., R. 10 W.	26	NWNW	40.00	PD
T. 6 S., R. 10 W.	35	SENE	40.00	PD
T. 7 S., R. 1 E.	1	SESW	40.00	OC
T. 7 S., R. 1 E.	23	SESE	40.00	OC
T. 7 S., R. 3 W.	29	Lot 3	5.42	OC
T. 7 S., R. 6 W.	34	SWSE	40.00	OC
T. 7 S., R. 10 W.	20	NE	160.00	PD
T. 7 S., R. 10 W.	30	WNE, SENE, ESE	200.00	PD
T. 8 S., R. 1 E.	3	SWNW, SW	200.00	OC
T. 8 S., R. 1 E.	27	NESW	40.00	OC
T. 8 S., R. 1 E.	35	Lots 1, 2, NWNW, 52	400.22	OC
T. 8 S., R. 4 W.	24	M&B	1.54	OT
T. 8 S., R. 4 W.	25	M&B	.08	OT
T. 8 S., R. 10 W.	20	WNWNW	20.00	PD
T. 8 S., R. 11 W.	3	Lot 8	4.73	PD
T. 9 S., R. 1 W.	21	Lot 7, NWNE	84.21	OC
T. 9 S., R. 3 W.	21	Lot 3	.08	OT
T. 9 S., R. 3 W.	24	UN Lot	1.40	PD
T. 9 S., R. 3 W.	32	Lot 2	4.60	PD
T. 9 S., R. 4 W.	9	Lot 5	1.16	OC
T. 9 S., R. 4 W.	14	Lot 9	.17	PD
T. 9 S., R. 5 W.	32	Lots 1, 2	2.90	PD
T. 9 S., R. 9 W.	19	Por. Lot 29	10.00	PD
T. 9 S., R. 9 W.	33	Lot 17	20.00	PD
T. 9 S., R. 9 W.	34	WNWSW	20.00	PD
T. 9 S., R. 10 W.	26	SWNW	40.00	PD

Land Tenure Adjustment, Zone 3 Lands (continued)

Township	Section	Subdivision	Acres	Status
T. 9 S., R. 10 W.	36	POR. Lots 5, 6	10.00	PD
T. 9 S., R. 11 W.	1	Lot 6	1.46	PD
T. 9 S., R. 11 W.	4	SWSW	40.00	PD
T. 10 S., R. 2 W.	8	Lot 1	6.13	PD
T. 10 S., R. 3 W.	24	Lot 6	.90	PD
T. 10 S., R. 4 W.	11	Lot 5	1.52	OC
T. 10 S., R. 5 W.	19	Lots 1-4, NE, ENW, ESW	480.00	OC
T. 10 S., R. 5 W.	23	Lot 4	0.79	OC
T. 10 S., R. 5 W.	29	NENE, NSW, NSE	145.00	OC
T. 10 S., R. 6 W.	22	Lots 2, 3	15.70	PD
T. 10 S., R. 7 W.	18	SWNE, SESW, WSE	160.00	PD
T. 10 S., R. 10 W.	2	Lot 20	20.00	PD
T. 11 S., R. 3 W.	1	Lot 11	.15	OT
T. 11 S., R. 7 W.	14	Lot 5	.14	PD
T. 11 S., R. 7 W.	23	Lots 1, 2	1.39	OT
T. 11 S., R. 8 W.	6	NESW, NWSE, SESE	120.00	PD
T. 11 S., R. 9 W.	31	Lot 2	43.25	PD
T. 11 S., R. 10 W.	12	NNE, NWSW, NESE	160.00	PD
T. 11 S., R. 10 W.	14	Lot 1	2.87	PD
T. 11 S., R. 10 W.	15	Lot 13	3.85	PD
T. 11 S., R. 10 W.	23	NESE	40.00	PD
T. 11 S., R. 10 W.	24	SWSW	40.00	PD
T. 11 S., R. 10 W.	25	Lot 1	37.22	PD
T. 11 S., R. 10 W.	35	SESE	40.00	PD
T. 12 S., R. 3 E.	23	SESW, SWSE	80.00	PD
T. 12 S., R. 4 E.	30	SESW	40.00	PD
T. 12 S., R. 4 E.	31	Lot 1, NENW	84.81	PD
T. 12 S., R. 1 W.	34	Lot 10	11.45	PD
T. 12 S., R. 2 W.	13	Lot 6	7.04	OT
T. 12 S., R. 4 W.	1	Lot 3	.23	OC
T. 12 S., R. 6 W.	35	Lot 3	.20	OT
T. 12 S., R. 8 W.	6	Lot 7	40.18	PD
T. 12 S., R. 8 W.	7	Lots 1, 2	79.04	PD
T. 12 S., R. 9 W.	29	ENE, SESE	120.00	PD
T. 12 S., R. 9 W.	32	ENE, SWNE	120.00	PD
T. 12 S., R. 9 W.	34	NENW	40.00	PD
T. 12 S., R. 9 W.	35	NENW, SSW	120.00	PD
T. 12 S., R. 10 W.	6	SWSE	40.00	PD
T. 12 S., R. 10 W.	14	NENE	40.00	PD
T. 12 S., R. 10 W.	25	SW, SE	320.00	PD
T. 12 S., R. 10 W.	35	NESE	320.00	PD
T. 12 S., R. 11 W.	9	Lots 5-8, SWNW	201.76	PD
T. 12 S., R. 11 W.	10	Lots 3, 4	76.16	PD
T. 12 S., R. 11 W.	17	Lot 5	38.84	PD
T. 13 S., R. 3 E.	9	NENE	40.00	PD
T. 13 S., R. 3 E.	24	NNE, SENE	120.00	PD
T. 13 S., R. 2 W.	21	NWNE	40.00	OC
T. 13 S., R. 4 W.	30	Lot 5	8.49	PD
T. 13 S., R. 5 W.	29	Lot 1	.84	OC

Land Tenure Adjustment, Zone 3 Lands (continued)

Township	Section	Subdivision	Acres	Status
T. 13 S., R. 9 W.	5	SW	160.00	PD
T. 13 S., R. 9 W.	10	ENE, NESE	120.00	PD
T. 13 S., R. 9 W.	13	NWNW	40.00	PD
T. 13 S., R. 9 W.	20	SSW, SWSE	120.00	PD
T. 13 S., R. 11 W.	3	SWSE	40.00	PD
T. 13 S., R. 11 W.	22	Lots 19, 20	78.23	PD
T. 13 S., R. 11 W.	23	Lot 3	39.15	PD
T. 13 S., R. 11 W.	26	ESE	80.00	PD
T. 13 S., R. 11 W.	28	Lot 9	7.60	PD
T. 13 S., R. 11 W.	33	NESE	40.00	PD
T. 14 S., R. 5 W.	25	Lot 1	.26	OC
T. 14 S., R. 11 W.	3	Lots 1, 2, 25	111.50	PD
T. 14 S., R. 11 W.	4	Lots 29, 30	84.30	PD
T. 14 S., R. 11 W.	5	Lot 10	40.62	PD
T. 14 S., R. 11 W.	6	Lot 16	40.00	PD
T. 14 S., R. 11 W.	10	Lots 1, 11-13, 17	210.21	PD
T. 14 S., R. 11 W.	15	NESE	40.00	PD
T. 14 S., R. 12 W.	35	SENE	40.00	PD
T. 15 S., R. 5 W.	6	Lot 5	1.46	PD
T. 15 S., R. 9 W.	1	Lot 3, SENW, NESE	20.94	OC

E = East; N = North; S = South; W = West; UN = Unnumbered.

PD = Public Domain Land; OC = Oregon and California Revested Railroad Land; OT = Other.

NOTE: Some tracts in zone 3 are not available for disposal due to the presence of special resource values. They are not included in this list.

Sources: Western Oregon Digital Data Base and Salem District realty records.

Appendix O

Land Tenure Adjustment Criteria

The following criteria would be used to evaluate opportunities for disposal or acquisition of lands to meet resource management objectives for multiple use and sustained yield. This is in accordance with the Federal Land Policy and Management Act and other laws, executive orders, departmental and bureau policy. This list is not all inclusive.

- Threatened, endangered or sensitive plant and animal species habitat
- Riparian areas and wetlands
- Fish habitat
- Nesting/breeding habitat for game and nongame animals
- Key big game seasonal habitat
- Developed recreation sites and recreation use areas
- High quality scenery
- Energy and mineral potential
- Land adjacent to rivers eligible for designation under the National Wild and Scenic Rivers Act
- Public health and safety
- Significant cultural resources and sites eligible for inclusion in the National Register of Historic Places
- Designated wilderness areas and areas being studied for possible wilderness designation
- Accessibility of the land for public recreation and other uses
- Amount of public investments in facilities or improvements and the potential for recovering those investments
- Difficulty or cost of administration (manageability)
- Suitability of the land for management by another federal agency
- Significance of the decision in stabilizing business, social and economic conditions, and/or lifestyles
- Whether private sites exist for the proposed use
- Encumbrances, including but not limited to, withdrawals or existing leases or permits
- Consistency with cooperative agreements and plans or policies of other agencies
- Suitability (need for change in land ownership or use) for purposes including but not limited to community expansion or economic development, such as industrial, residential, or agricultural (other than grazing) development

Appendix P

Monitoring

All Land Use Allocations

Expected Future Conditions and Outputs

Protection of SEIS special attention species so as not to elevate their status to any higher level of concern.

Implementation Monitoring

Questions

1. Are surveys for the species listed in appendix F conducted before ground-disturbing activities occur?
2. Are protection buffers being provided for specific rare and locally endemic species and other species in the upland forest matrix?
3. Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens and arthropod species listed in appendix F being protected?
4. Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens and arthropod species listed in appendix F being surveyed?
5. Are high priority sites for species management being identified?
6. Are general regional surveys being conducted to acquire additional information and to determine necessary levels of protection for arthropods, fungi species that were not classed as rare and endemic, bryophytes, and lichens?

Monitoring Requirements

1. At least twenty percent of all management actions will be examined prior to project initiation and re-examined following project completion, to determine if: surveys are conducted for species listed in appendix F; protection buffers are provided for specific rare and locally endemic species and other species in the upland forest matrix; and sites of species listed in appendix F are protected.
2. The Annual Program Summary will address Implementation questions 4 through 6.

Effectiveness and Validation Monitoring

Questions

1. Are measures taken to protect the SEIS special attention species effective?
2. Is the forest ecosystem functioning as a productive and sustainable ecological unit?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Riparian Reserves

Expected Future Conditions and Outputs

See Aquatic Conservation Strategy Objectives.

Provision of habitat for special status and SEIS special attention species.

Implementation Monitoring

Questions

1. Are watershed analyses being completed before on-the-ground actions are initiated in Riparian Reserves?
2. Is the width and integrity of the Riparian Reserves being maintained?
(e.g., did the conditions that existed before management activities change in ways that are not in accordance with the SEIS record of decision Standards and Guidelines and resource management plan management direction?)
3. What silvicultural practices are being applied to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives?
4. Are management activities in Riparian Reserves consistent with SEIS record of decision Standards and Guidelines, resource management plan management direction and Aquatic Conservation Strategy objectives?
5. Are new structures and improvements in Riparian Reserves constructed to minimize the diversion of natural hydrologic flow paths, reduce the amount of sediment delivery into the stream, protect fish and wildlife populations and accommodate the 100-year flood?
6. (A) Are all mining structures, support facilities and roads located outside the Riparian Reserves? (B) Are those located within the Riparian Reserves meeting the objectives of the Aquatic Conservation Strategy? (C) Are all solid and sanitary waste facilities excluded from Riparian Reserves or located, monitored and reclaimed in accordance with SEIS record of decision Standards and Guidelines and resource management plan management direction?
7. Are new recreation facilities within the Riparian Reserves designed to meet, and where practicable, contribute to Aquatic Conservation Strategy objectives? Are mitigation measures initiated where existing recreation facilities are not meeting Aquatic Conservation Strategy objectives?

Monitoring Requirements

1. The files on each year's on-the-ground actions will be checked annually to ensure that watershed analyses were completed prior to project initiation and to ensure the concerns identified in the watershed analysis were addressed in the project's environmental assessment.
2. At least twenty percent of management activities within each resource area will be examined prior to project initiation and re-examined following project completion, to determine whether the width and integrity of the Riparian Reserves were maintained.
3. The Annual Program Summary will report what silvicultural practices are being applied in order to attain Aquatic Conservation Strategy objectives.
4. At least twenty percent of the activities that are conducted or authorized within Riparian Reserves will be reviewed in order to identify whether the actions were consistent with the SEIS record of decision Standards and Guidelines, resource management plan management direction and Aquatic Conservation Strategy objectives. In addition to reporting the results of this monitoring, the Annual Program Summary will also summarize the types of activities that were conducted or authorized within Riparian Reserves.
5. All new structures and improvements within a Riparian Reserve will be monitored during and after construction to ensure that it was constructed to: minimize the diversion of natural hydrologic flow paths, reduce the amount of sediment delivery into the stream, protect fish and wildlife populations and accommodate the 100-year flood.
6. All approved mining Plans of Operations will be reviewed to determine if: A) both a reclamation plan and bond were required; B) structures, support facilities and roads were located outside of Riparian Reserves, or in compliance with Aquatic Conservation Strategy objectives if located inside the Riparian Reserve; and C) solid and sanitary waste facilities were excluded from Riparian Reserves or located, monitored and reclaimed in accordance with resource management plan management direction.
7. The Annual Program Summary will examine status of evaluations of existing recreational facilities inside Riparian Reserves, to ensure that Aquatic Conservation Strategy objectives are met. The Summary will also report on the status of the mitigation measures initiated where the Aquatic Conservation Strategy objectives cannot be met.

Effectiveness and Validation Monitoring

Questions

1. Is the health of Riparian Reserves improving?
2. Are management actions designed to rehabilitate Riparian Reserves effective?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Late-Successional Reserves

Expected Future Conditions and Outputs

Development and maintenance of a functional, interacting, late-successional and old-growth forest ecosystem in Late-Successional Reserves.

Protection and enhancement of habitat for late-successional and old-growth forest-related species including the northern spotted owl and marbled murrelet.

Implementation Monitoring

Questions

1. What is the status of the preparation of assessments and fire plans for Late-Successional Reserves?
2. What activities were conducted or authorized within Late-Successional Reserves and how were they compatible with the objectives of the Late-Successional Reserve plan? Were the activities consistent with SEIS record of decision Standards and Guidelines, resource management plan management direction and Regional Ecosystem Office review requirements and the Late-Successional Reserve assessment?
3. What is the status of development and implementation of plans to eliminate or control nonnative species which adversely impact late-successional objectives?
4. What land acquisitions occurred, or are underway, to improve the area, distribution, and quality of Late-Successional Reserves?

Monitoring Requirements

1. The Annual Program Summary will address Implementation questions 1 through 4.

Effectiveness and Validation Monitoring

Questions

1. Are forest management activities (e.g., special forest product harvest activities) within Late-Successional Reserves compatible with the goal of developing and maintaining a functional, interacting, late-successional and old-growth forest ecosystem?
2. Does the harvest of special forest products have adverse effects on Late-Successional Reserve objectives?
3. Is a functional, interacting, late-successional ecosystem maintained where adequate, and restored where inadequate?
4. Did silvicultural treatments benefit the creation and maintenance of late-successional conditions?
5. What is the relationship between levels of management intervention and the health and maintenance of late-successional and old-growth ecosystems?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Adaptive Management Areas

Expected Future Conditions and Outputs

Utilization of Adaptive Management Areas for the development and application of new management approaches for the integration and achievement of ecological health, and economic and other social objectives.

Provision of well-distributed, late-successional habitat outside reserves; retention of key structural elements of late-successional forests on lands subjected to regeneration harvest; restoration and protection of riparian zones; and provision of a stable timber supply.

Implementation Monitoring

Questions

1. Are the Adaptive Management Area plans being developed, and do they establish future desired conditions?

Monitoring Requirements

1. The Annual Program Summary will address Implementation question 1.

Effectiveness and Validation Monitoring

Deferred to SEIS Monitoring Plan and individual Adaptive Management Area management plans.

Matrix

Expected Future Conditions and Outputs

Production of a stable supply of timber and other forest commodities.

Maintenance of important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.

Assurance that forests in the Matrix provide for connectivity between Late-Successional Reserves.

Provision of habitat for a variety of organisms associated with early and late-successional forests.

Questions

1. Are suitable numbers of snags, coarse woody debris and green trees being left, following timber harvest, as called for in the SEIS record of decision Standards and Guidelines and resource management plan management direction?
2. Are timber sales being designed to meet ecosystem goals for the Matrix?
3. Are late-successional stands being retained in fifth-field watersheds in which federal forest lands have 15 percent or less late-successional forest?
4. What is the age and type of the harvested stands?

Monitoring Requirements

1. At least twenty percent of regeneration harvest timber sales in each resource area will be examined by pre- and post-harvest (and after site preparation) inventories to determine snag and green tree numbers, heights, diameters and distribution within harvest units. The measure of distribution of snags and green trees will be the percent in the upper, middle and lower thirds of the sale units monitored. Snags and green trees left following timber harvest activities (including site preparation for reforestation) will be compared to those that were marked prior to harvest.

The same timber sales will also be inventoried pre- and post-harvest to determine if SEIS record of decision and resource management plan down log retention direction has been followed.

- At least twenty percent of the files on each year's timber sales will be reviewed annually to determine if ecosystem goals were addressed in the silvicultural prescriptions.
- All proposed regeneration harvest timber sales in watersheds with less than 15 percent late-successional forest remaining will be reviewed prior to sale to ensure that a watershed analysis has been completed.
- The Annual Program Summary will address Implementation question 4.

Effectiveness and Validation Monitoring

Questions

- Are stands growing at a rate that will produce the predicted yields?
- Are forests in the Matrix providing for connectivity between Late-Successional Reserves?

Monitoring Requirements

Deferred to the SEIS Monitoring Plan.

Air Quality

Expected Future Conditions and Outputs

Attainment of National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and Oregon visibility protection plan and smoke management plan goals.

Maintenance and enhancement of air quality and visibility in a manner consistent with the Clean Air Act and the state implementation plan.

Implementation Monitoring

Questions

- Were efforts made to minimize the amount of particulate emissions from prescribed burns?
- Are dust abatement measures used during construction activities and on roads during BLM timber harvest operations and other BLM commodity hauling activities?
- Are conformity determinations being prepared prior to activities which may contribute to a new violation of the National Ambient Air Quality Standards, increase the frequency or severity of an existing violation, or delay the timely attainment of a standard?

Monitoring Requirements

- At least twenty percent of prescribed burn projects will be randomly selected for monitoring to assess what efforts were made to minimize particulate emissions, and whether the environmental analysis that preceded the decision to burn addressed the questions set forth in the SEIS discussion of Emission Monitoring (pg. 3&4-100).
- At least twenty percent of the construction activities and commodity hauling activities will be monitored to determine if dust abatement measures were implemented.
- The Annual Program Summary will address Implementation question 3.

Effectiveness and Validation Monitoring

Questions

- What techniques were the most effective in minimizing the amount of particulate emissions from prescribed burns?

2. Are BLM prescribed burns contributing to intrusions into Class I areas or nonattainment areas?
3. Of the intrusions that the BLM is reported to be responsible for, what was the cause and what can be done to minimize future occurrences?
4. Are BLM prescribed underburns causing adverse air quality impacts to rural communities?
5. Are prescribed fires decreasing the actual or potential impacts from wildfire emissions?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Water and Soils

Expected Future Conditions and Outputs

Restoration and maintenance of the ecological health of watersheds. See Aquatic Conservation Strategy Objectives.

Compliance with state water quality requirements to restore and maintain water quality to protect recognized beneficial uses.

Improvement and/or maintenance of soil productivity.

Reduction of existing road mileage within Key Watersheds.

Implementation Monitoring

Questions

1. Are site-specific best management practices, identified as applicable during interdisciplinary review, carried forward into project design and execution?
2. What watershed analyses have been or are being performed? Are watershed analyses being performed prior to management activities in Key Watersheds?
3. What is the status of identification of in-stream flow needs for the maintenance of channel conditions, aquatic habitat and riparian resources?
4. What watershed restoration projects are being developed and implemented?
5. What fuel treatment and fire suppression strategies have been developed to meet Aquatic Conservation Strategy objectives?
6. What is the status of development of road or transportation management plans to meet Aquatic Conservation Strategy objectives?
7. What is the status of preparation of criteria and standards which govern the operation, maintenance, and design for the construction and reconstruction of roads?
8. What is the status of the reconstruction of roads and associated drainage features identified in watershed analysis as posing a substantial risk? What is the status of closure or elimination of roads to further Aquatic Conservation Strategy objectives; and to reduce the overall road mileage within Key Watersheds? If funding is insufficient to implement road mileage reductions, are construction and authorizations through discretionary permits, denied to prevent a net increase in road mileage in Key Watersheds?
9. What is the status of reviews of ongoing research in Key Watersheds to insure that significant risk to the watershed does not exist?
10. What is the status of evaluation of recreation, interpretive and user-enhancement activities/facilities to determine their effects on the watershed? What is the status of eliminating or relocating these activities/facilities when found to be in conflict with Aquatic Conservation Strategy objectives?
11. What is the status of cooperation with other agencies in the development of watershed-based Research Management Plans and other cooperative agreements to meet Aquatic Conservation Strategy objectives? What is the status of cooperation with other agencies to identify and eliminate wild ungulate impacts which are inconsistent with attainment of Aquatic Conservation Strategy objectives?

Monitoring Requirements

1. At least twenty percent of the timber sales and silviculture projects stratified by management category will be randomly selected for monitoring to determine whether or not best management practices were implemented as prescribed. The selection of management actions to be monitored will be based on beneficial uses likely to be impacted, and for which best management practices are being prescribed.
2. Compliance checks will be completed for all agreements entered into with providers of municipal water.
3. The Annual Program Summary will address Implementation questions 3 through 11.

Effectiveness and Validation Monitoring

Questions

1. Is the ecosystem function of the watersheds improving?
2. Are state water quality criteria being met? When state water quality criteria is met, are the beneficial uses of riparian areas protected?
3. Are prescribed best management practices maintaining or restoring water quality consistent with basin specific state water quality criteria for protection of specified beneficial uses?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Wildlife Habitat

Expected Future Conditions and Outputs

Maintenance of biological diversity and ecosystem health to contribute to healthy wildlife populations.

Implementation Monitoring

Questions

1. Are suitable (diameter, length, and numbers) of snags, coarse woody debris and green trees being left, in a manner that meets the needs of species and provides for ecological functions in harvested areas as called for in the SEIS record of decision Standards and Guidelines and resource management plan management direction?
2. Are special habitats being identified and protected?
3. What is the status of designing and implementing wildlife habitat restoration projects?
4. What is the status of designing and constructing wildlife interpretive and other user-enhancement facilities?

Monitoring Requirements

1. At least twenty percent of regeneration harvest timber sales in each resource area will be examined by pre- and post-harvest (and after site preparation) inventories to determine snag and green tree numbers, heights, diameters and distribution within harvest units. The measure of distribution of snags and green trees will be the percent in the upper, middle and lower thirds of the sale units monitored. Snags and green trees left following timber harvest activities (including site preparation for reforestation) will be compared to those that were marked prior to harvest.

The same timber sales will also be inventoried pre- and post-harvest to determine if SEIS record of decision and resource management plan down log retention direction has been followed.

2. At least twenty percent of BLM actions, within each resource area, on lands including or near special habitats will be examined to determine whether special habitats were protected.
3. The Annual Program Summary will address Implementation questions 3 and 4.

Effectiveness and Validation Monitoring

Questions

1. Are habitat conditions for late-successional forest associated species maintained where adequate, and restored where inadequate?
2. Are the snags, green trees and coarse woody debris being left, achieving the habitat necessary to attain the desired population at a relevant landscape level?
3. Are BLM actions intended to protect special habitats actually protecting the habitat? Is the protection of special habitats helping to protect the species population?
4. What are the effects of management on species richness (numbers and diversity)?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

(Which will address a variety of wildlife species such as amphibians, mollusks, neotropical migratory birds, etc.)

Fish Habitat

Expected Future Conditions and Outputs

See Aquatic Conservation Strategy Objectives.

Maintenance or enhancement of the fisheries potential of streams and other waters, consistent with BLM's Anadromous Fish Habitat Management on Public Lands guidance, BLM's Fish and Wildlife 2000 Plan, the Bring Back the Natives initiative, and other nationwide initiatives.

Rehabilitation and protection of at-risk fish stocks and their habitat.

Implementation Monitoring

Questions

1. Are at-risk fish species and stocks being identified?
2. Are fish habitat restoration and enhancement activities being designed and implemented which contribute to attainment of Aquatic Conservation Strategy objectives?
3. Are potential adverse impacts to fish habitat and fish stocks being identified?

Monitoring Requirements

1. The Annual Program Summary will report on the status of watershed analysis to identify at-risk fish species and stocks, their habitat within individual watersheds, and restoration project needs.
2. The Annual Program Summary will report on the status of the design and implementation of fish habitat restoration and habitat activities.
3. The Annual Program Summary will report on the status of cooperation with federal, tribal, and state fish management agencies to identify and eliminate impacts associated with poaching, harvest, habitat manipulation and fish stocking which threaten the continued existence and distribution of native fish stocks inhabiting federal lands. The summary will also identify any management activities or fish interpretive and other user-enhancement facilities which have detrimental effects on native fish stocks.
4. At least twenty percent of the files on each year's timber sales, and other relevant actions, will be reviewed annually to evaluate documentation regarding fish species and habitat and related recommendations and decisions in light of policy and SEIS record of decision Standards and Guidelines and resource management plan management direction. If mitigation was required, review will ascertain whether such mitigation was incorporated in the authorization document and the actions will be reviewed on the ground after completion to ascertain whether the mitigation was carried out as planned.

Effectiveness and Validation Monitoring

Questions

1. Is the ecological health of the aquatic ecosystems recovering or sufficiently maintained to support stable and well-distributed populations of fish species and stocks?
2. Is fish habitat in terms of quantity and quality of rearing pools, coarse woody debris, water temperature and width to depth ratio being maintained or improved as predicted?
3. Are desired habitat conditions for listed, sensitive, and at-risk fish stocks maintained where adequate, and restored where inadequate?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Special Status and SEIS Special Attention Species and Habitat

Expected Future Conditions and Outputs

Protection, management and conservation of federally listed and proposed species and their habitats, to achieve their recovery in compliance with the Endangered Species Act and bureau special status species policies.

Conservation of federal candidate and bureau sensitive species and their habitats so as not to contribute to the need to list and recover the species.

Conservation of state-listed species and their habitats to assist the state in achieving management objectives.

Maintenance or restoration of community structure, species composition, and ecological processes of special status plant and animal habitat.

Protection of bureau assessment species and SEIS special attention species so as not to elevate their status to any higher level of concern.

Implementation Monitoring

Questions

1. Are special status species being addressed in deciding whether or not to go forward with forest management and other actions? During forest management and other actions that may disturb special status species, are steps taken to adequately mitigate disturbances?
2. Are the actions identified in plans to recover species being implemented in a timely manner?
3. What coordination with other agencies has occurred in the management of special status species?
4. What land acquisitions occurred or are under way, to facilitate the management and recovery of special status species?
5. What site specific plans for the recovery of special status species were or are being developed?
6. What is the status of analysis which ascertains species requirements or enhances the recovery or survival of a species?
7. What is the status of efforts to maintain or restore the community structure, species composition and ecological processes of special status plant and animal habitat?

Monitoring Requirements

1. At least twenty percent of the files on each year's timber sales and other relevant actions (e.g., rights-of-way, instream structures) will be reviewed annually to evaluate documentation regarding special status species and related recommendations and decisions in light of Endangered Species Act requirements, policy and

SEIS record of decision Standards and Guidelines and resource management plan management direction. If mitigation was required, review will ascertain whether such mitigation was incorporated in the authorization document and the actions will be reviewed on the ground after completion to ascertain whether the mitigation was carried out as planned.

2. Review implementation schedule and actions taken annually, to ascertain if the actions to recover species were carried out as planned.
3. The Annual Program Summary will address Implementation questions 3 through 7.

Effectiveness and Validation Monitoring

Questions

1. Are trends for special status species meeting the objectives of mitigation and/or conservation actions?
2. Have any Federal Candidate, Bureau Assessment or Bureau Sensitive species been elevated to higher levels of concern due to BLM management?
3. Were desired habitat conditions for the northern spotted owl and marbled murrelet maintained where adequate and restored where inadequate?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

(Which will address a variety of special status species including marbled murrelet, bald eagle, northern spotted owl, anadromous fish species, etc.)

Special Areas

Expected Future Conditions and Outputs

Maintenance, protection and/or restoration of the relevant and important values of the special areas which include: Areas of Critical Environmental Concern, Outstanding Natural Areas, Research Natural Areas, and Environmental Education Areas.

Provision of recreation uses and environmental education in outstanding natural areas. Management of uses to prevent damage to those values that make the area outstanding.

Preservation, protection or restoration of native species composition and ecological processes of biological communities in research natural areas.

Provision and maintenance of environmental education opportunities in environmental education areas. Management of uses to minimize disturbances of educational values.

Retention of existing research natural areas and existing areas of critical environmental concern that meet the test for continued designation. Retention of other special areas. Provision of new special areas where needed to maintain or protect important values.

Implementation Monitoring

Questions

1. Are BLM actions and BLM-authorized actions/uses near or within special areas consistent with resource management plan objectives and management direction for special areas?
2. What is the status of the preparation, revision and implementation of area of critical environmental concern management plans?
3. Are interpretive programs and recreation uses being developed and encouraged in outstanding natural areas? Are the outstanding values of the outstanding natural areas being protected from damage?
4. What environmental education and research initiatives and programs are occurring in the research natural areas and environmental education areas?

5. Are existing BLM actions and BLM-authorized actions and uses not consistent with management direction for special areas being eliminated or relocated?
6. Are actions being identified which are needed to maintain or restore the important values of the special areas? Are the actions being implemented?
7. Are protection buffers being provided for specific rare and locally endemic species and other species in the upland forest matrix?

Monitoring Requirements

1. Annually, the files on all actions and research proposals within and adjacent to special areas will be reviewed to determine whether the possibility of impacts on area of critical environmental concern values was considered, and whether any mitigation identified as important for maintenance of area of critical environmental concern values was required. If mitigation was required, the relevant actions will be reviewed on the ground, after completion, to ascertain whether it was actually implemented.
2. The Annual Program Summary will address Implementation questions 2 through 7.

Effectiveness and Validation Monitoring

Questions

1. Are the implemented management actions, designed to protect the values of the special areas, effective?
2. Are the special areas managed to restore or prevent the loss of outstanding values and minimize disturbance?

Monitoring Requirements

1. Each special area will be monitored at least every three years to determine if the values for which it was designated are being maintained.
2. Each area of critical environmental concern will be monitored annually to determine if proactive management actions met their objectives.

Cultural Resources Including American Indian Values

Expected Future Conditions and Outputs

Identification of cultural resource localities for public, scientific, and cultural heritage purposes.

Conservation and protection of cultural resource values for future generations.

Provision of information on long-term environmental change and past interactions between humans and the environment.

Fulfillment of responsibilities to appropriate American Indian groups regarding heritage and religious concerns.

Implementation Monitoring

Questions

1. Are cultural resources being addressed in deciding whether or not to go forward with forest management and other actions? During forest management and other actions that may disturb cultural resources, are steps taken to adequately mitigate disturbances?
2. What mechanisms have been developed to describe past landscapes and the role of humans in shaping those landscapes?
3. What efforts are being made to work with American Indian groups to accomplish cultural resource objectives and achieve goals outlined in existing memoranda of understanding and develop additional memoranda as needs arise?

4. What public education and interpretive programs were developed to promote the appreciation of cultural resources?

Monitoring Requirements

1. At least twenty percent of the files on each year's timber sales and other relevant actions (e.g., rights-of-way, instream structures) will be reviewed annually to evaluate documentation regarding cultural resources and American Indian values and decisions in light of requirements, policy and SEIS record of decision Standards and Guidelines and resource management plan management direction. If mitigation was required, review will ascertain whether such mitigation was incorporated in the authorization document and the actions will be reviewed on the ground after completion to ascertain whether the mitigation was carried out as planned.
2. The Annual Program Summary will address Implementation questions 2 through 4.

Effectiveness and Validation Monitoring

Questions

1. Are sites of religious and cultural heritage adequately protected?
2. Do American Indians have access to and use of forest species, resources and places important for cultural, subsistence, or economic reasons; particularly those identified in treaties?

Monitoring Requirements

1. All cultural resource sites, where management and/or mitigation measures are utilized to protect the resource, will be monitored at least once a year to determine if the measures were effective.

The balance is deferred to SEIS Monitoring Plan.

Visual Resources

Expected Future Conditions and Outputs

Preservation or retention of the existing character of landscapes on BLM-administered lands allocated for visual resource management class I and II management; partial retention of the existing character on lands allocated for visual resource management class III management and major modification of the existing character of some lands allocated for visual resource management class IV management.

Continuation of emphasis on management of scenic resources in selected high-use areas to retain or preserve scenic quality.

Implementation Monitoring

Questions

1. Are visual resource design features and mitigation methods being followed during timber sales and other substantial actions in class II and III areas?

Monitoring Requirements

1. Twenty percent of the files for timber sales and other substantial projects in visual resource management class II or III areas will be reviewed to ascertain whether relevant design features or mitigating measures were included.

Effectiveness and Validation Monitoring

Questions

1. Are timber sales and other major actions in class II and class III areas meeting or exceeding visual resource management objectives?

2. Are visual resource management objectives being met consistently, over long periods of time, in class II management areas?

Monitoring Requirements

1. All timber sales and other selected projects in visual resource management class II areas and at least twenty percent of sales or projects in class III areas that have special design features, or mitigating measures for visual resource protection, will be monitored to evaluate the effectiveness of the practices used to conserve visual resources.
2. In visual resource management class II management areas, where two or more sales or actions have occurred, impacts will be monitored at a minimum interval of five years.

Wild and Scenic Rivers

Expected Future Conditions and Outputs

Protection of the outstandingly remarkable values of designated components of the National Wild and Scenic Rivers System through the maintenance and enhancement of the natural integrity of river-related values.

Protection of the outstandingly remarkable values of eligible/suitable wild and scenic rivers and the maintenance or enhancement of the highest tentative classification pending resolution of suitability and/or designation.

Protection of the natural integrity of river-related values for the maintenance or enhancement of the highest tentative classification determination for rivers found eligible or studied for suitability.

Designation of important and manageable river segments suitable for designation where such designation contributes to the National Wild and Scenic Rivers System.

Implementation Monitoring

Questions

1. Are BLM actions and BLM-authorized actions consistent with protection of the outstandingly remarkable values of designated, suitable, and eligible but not studied, rivers?
2. Are existing plans being revised to conform to Aquatic Conservation Strategy objectives? Are revised plans being implemented?

Monitoring Requirements

1. Annually, the files on all actions and research proposals within and adjacent to wild and scenic river corridors will be reviewed to determine whether the possibility of impacts on the outstandingly remarkable values was considered, and whether any mitigation identified as important for maintenance of the values was required. If mitigation was required, the relevant actions will be reviewed on the ground, after completion, to ascertain whether it was actually implemented.
2. The Annual Program Summary report will summarize progress on preparation and revision of wild and scenic river management plans, their conformance with the Aquatic Conservation Strategy objectives, and the degree to which these plans have been implemented.

Effectiveness and Validation Monitoring

Questions

1. Are the outstandingly remarkable values for which the wild and scenic rivers were designated being maintained?
2. Are the outstandingly remarkable values of the rivers which were found suitable or eligible but not studied, protected?

Monitoring Requirements

1. Each wild and scenic river will be monitored at least once a year to determine if the outstandingly remarkable values are being maintained.
2. Each river, which was found suitable or eligible but not studied, will be monitored at least once a year to determine if the outstandingly remarkable values are being maintained.

Rural Interface Areas

Expected Future Conditions and Outputs

Consideration of the interests of adjacent and nearby rural land owners, including residents, during analysis, planning and monitoring related to managed rural interface areas. (These interests include personal health and safety, improvements to property, and quality of life.)

Determination of how land owners might be or are affected by activities on BLM-administered lands.

Implementation Monitoring

Questions

1. Are design features and mitigation measures developed and implemented to avoid/minimize impacts to health, life and property and quality of life and to minimize the possibility of conflicts between private and federal land management?

Monitoring Requirements

1. At least twenty percent of all actions within the identified rural interface areas will be examined to determine if special project design features and mitigation measures were included and implemented as planned.

Effectiveness and Validation Monitoring

Questions

1. Are the rural interface area design features and mitigation measures effective in minimizing impacts to health, life and property?

Monitoring Requirements

1. At least twenty percent of actions within the identified rural interface areas which had design features or mitigation measures will be examined following completion to assess the effectiveness of the action.

Socioeconomic Conditions

Expected Future Conditions and Outputs

Contribution to local, state, national, and international economies through sustainable use of BLM-administered lands and resources and use of innovative contracting and other implementation strategies.

Provision of amenities for the enhancement of communities as places to live and work.

Implementation Monitoring

Questions

1. What strategies and programs have been developed, through coordination with state and local governments, to support local economies and enhance local communities?

2. Are resource management plan implementation strategies being identified that support local economies?
3. What is the status of planning and developing amenities that enhance local communities, such as recreation and wildlife viewing facilities?

Monitoring Requirements

1. The Annual Program Summary will address Implementation questions 1 through 3.

Effectiveness and Validation Monitoring

Questions

1. What level of local employment is supported by BLM timber sales and forest management practices?
2. What were Oregon and California and Coos Bay Wagon Road payments to counties?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Recreation

Expected Future Conditions and Outputs

Provision of a wide range of developed and dispersed recreation opportunities that contribute to meeting projected recreation demand within the planning area.

Provision of nonmotorized recreational opportunities and creation of additional opportunities consistent with other management objectives.

Implementation Monitoring

Questions

1. What is the status of the development and implementation of recreation plans?

Monitoring Requirements

1. The Annual Program Summary will address Implementation question 1.

Effectiveness and Validation Monitoring

Questions

1. Based on the Statewide Comprehensive Outdoor Recreation Plan supply and demand data and public comments, is the range of recreation opportunities on BLM-administered lands (i.e., roaded vs. unroaded) meeting public needs?
2. Are BLM-developed recreation facilities meeting public needs and expectations, including facility condition and visitor safety considerations?
3. Are off-highway vehicle designations adequate to protect resource values while providing appropriate motorized vehicle recreation opportunities?

Monitoring Requirements

1. Each special recreation management area will be monitored at least every three years to determine if the types of recreation opportunities being provided are appropriate.
2. All developed recreation sites will be monitored annually to determine if facilities are being properly managed and all deficiencies documented.
3. All outstandingly remarkable value designations will be reviewed annually to determine if revisions are neces-

sary to protect resource values and resolve user conflicts.

Timber Resources

Expected Future Conditions and Outputs

Provision of a sustained yield of timber and other forest products.

Reduction of the risk of stand loss due to fires, animals, insects, and diseases.

Provision of salvage harvest for timber killed or damaged by events such as wildfire, windstorms, insects, or disease, in a manner consistent with management objectives for other resources.

Implementation Monitoring

Questions

1. By land-use allocation, how do timber sale volumes, harvested acres, and the age and type of regeneration harvest stands compare to the projections in the SEIS record of decision Standards and Guidelines and resource management plan management objectives?
2. Were the silvicultural (e.g., planting with genetically-selected stock, fertilization, release, and thinning) and forest health practices anticipated in the calculation of the expected sale quantity, implemented?

Monitoring Requirements

1. The Annual Program Summary will report both planned and non-planned volumes sold. The report will also summarize annual and cumulative timber sale volumes, acres to be harvested, and stand ages and types of regeneration harvest for General Forest Management Areas, Connectivity/Diversity Blocks and Adaptive Management Areas, stratified to identify them individually.
2. An annual districtwide report will be prepared to determine if the silvicultural and forest health practices identified and used in the calculation of the allowable sale quantity were implemented. This report will be summarized in the Annual Program Summary.

Effectiveness and Validation Monitoring

Questions

1. Is reforestation achieving desired stocking?
2. Are stands growing at a rate that will produce the predicted yields?
3. Is the long-term health and productivity of the forest ecosystem being protected in the Matrix?

Monitoring Requirements

1. First, third, and fifth year surveys will be used to determine if reforestation is meeting reforestation objectives.

The balance is deferred to SEIS Monitoring Plan.

Special Forest Products

Expected Future Conditions and Outputs

Production and sale of special forest products when demand is present and where actions taken are consistent with primary objectives for the land use allocation.

Utilization of the principles of ecosystem management to guide the management and harvest of special forest products.

Implementation Monitoring

Questions

1. Is the sustainability and protection of special forest product resources ensured prior to selling special forest products?
2. What is the status of the development and implementation of specific guidelines for the management of individual special forest products?

Monitoring Requirements

1. The Annual Program Summary will address Implementation questions 1 and 2.

Effectiveness and Validation Monitoring

Questions

1. Are special forest products being harvested at a sustainable level?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Noxious Weeds

Expected Future Conditions and Outputs

Containment and/or reduction of noxious weed infestations on BLM-administered lands using an integrated pest management approach.

Avoidance of the introduction or spread of noxious weed infestations in all areas.

Implementation Monitoring

Questions

1. Are noxious weed control methods compatible with Aquatic Conservation Strategy objectives?

Monitoring Requirements

1. Review the files of at least twenty percent of each year's noxious weed control applications to determine if noxious weed control methods were compatible with Aquatic Conservation Strategy objectives.

Effectiveness and Validation Monitoring

Questions

1. Are management actions effectively containing or reducing the extent of noxious weed infestations?

Monitoring Requirements

1. At least twenty percent of the noxious weed sites subjected to treatment will be monitored to determine if the treatment was effective.

Fire/Fuels Management

Expected Future Conditions and Outputs

Provision of the appropriate suppression responses to wildfires in order to meet resource management objectives and minimize the risk of large-scale, high intensity wildfires.

Utilization of prescribed fire to meet resource management objectives. (This will include, but not be limited to, fuels management for wildfire hazard reduction, restoration of desired vegetation conditions, management of habitat, and silvicultural treatments.)

Adherence to smoke management/air quality standards of the Clean Air Act and state implementation plan for prescribed burning.

Implementation Monitoring

Questions

1. What is the status of the preparation and implementation of fire management plans for Late-Successional Reserves and Adaptive Management Areas?
2. Have additional analysis and planning been completed to allow some natural fires to burn under prescribed conditions?
3. Do wildfire suppression plans emphasize maintaining late-successional habitat?
4. Are Wildfire Situation Analyses being prepared for wildfires that escape initial attack?
5. What is the status of the interdisciplinary team preparation and implementation of fuel hazard reduction plans?

Monitoring Requirements

1. The Annual Program Summary will address Implementation questions 1 through 5.

Effectiveness and Validation Monitoring

Questions

1. Are fire suppression strategies, practices, and activities meeting resource management objectives and concerns?
2. Are prescribed fires applied in a manner which retains the amount of coarse woody debris, snags, and duff at levels determined through watershed analysis?
3. Are fuel profiles being modified in order to lower the potential of fire ignition and rate of spread; and to protect and support land use allocation objectives by lowering the risk of high intensity, stand-replacing wildfires?

Monitoring Requirements

Deferred to SEIS Monitoring Plan.

Appendix Q

Proposed Withdrawals (Highway 101)

Legal Description	Acres	West of Highway 101	<u>East of Highway 101</u>	
			Within 1 Mile	Within 2 Miles
T. 3 S., R. 10 W., section 30, lot 15	.45	X		
T. 4 S., R. 10 W., section 19, lots 1 and 15	77.75	X		
section 28, lot 3	.53	X		
T. 5 S., R. 10 W. section 5, unnumbered lot in NE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$;	1.55	X		
section 5, unnumbered lot in NW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$;	.52	X		
section 6, lot 8;	N/E			
section 20, SE $\frac{1}{4}$ NE $\frac{1}{4}$	40.00		X	
T. 8 S., R. 11 W., section 3, lot 8	4.73	X		
T. 9 S., R. 11 W., section 4, SW $\frac{1}{4}$ SW $\frac{1}{4}$	40.00		X	
T. 13 S., R. 11 W., section 28, lot 9	7.60			X
T. 14 S., R. 12 W., section 35, SE $\frac{1}{4}$ NE $\frac{1}{4}$	<u>40.00</u>		X	
	213.13			
T. = Township; R. = Range; E = East; N = North; S = South; W = West.				
N/E = No Estimate				

Appendix R

Global Climate Analytical Assumptions

Many scientists have predicted significant global warming within the next sixty years, due to increasing levels of carbon dioxide and other gases in the atmosphere. Others have further hypothesized a climate change in western Oregon that would make it difficult or impossible to maintain, without change, the current ecosystems, including the major forest tree species. Among the relevant uncertainties, it is expected that warmer, drier weather would increase the incidence of wildfire, but warmer, wetter weather might reduce it. Rapid change may make the forest more susceptible to insect and disease attack because generational succession occurs much more quickly among pests than among trees. Other possible effects include raising soil temperatures and lengthening summer droughts. This could shift the range of Douglas-fir forest toward higher elevations, reduce the range for current high elevation species, and increase the range for dryland species such as lodgepole and ponderosa pine. Thus, management practices, particularly stand establishment and manipulation, could be affected. Assuring adequate tree regeneration would probably be the most serious management problem in areas that become marginal (Regens et al. 1989).

There is, however, no scientific consensus about the expected extent or rate of global warming or the probable effect on forest ecosystems in western Oregon. Neither the environmental record nor the limited capabilities of the climate models permit a reliable forecast of climate changes (National Academy of Sciences 1991).

Furthermore, available models show marked differences in their predictions of change in western Oregon (Joyce et al. 1990). In addition, the most commonly predicted temperature changes are not expected to affect woody biomass production or the dominance of Douglas-fir in the region, although they could alter codominant species composition in older forests (Dale and Franklin 1989). At the high end of the range of predicted changes, however, are temperature increases that could be great enough, by around the middle of the twenty-first century, to inadequately meet the winter chilling requirement for Douglas-fir to start growth again in the spring (Lavender 1989).

The increasing carbon dioxide levels are generally thought to be beneficial to plant growth, but available information does not suggest which forest tree species may be most responsive to that increase or how their responsiveness may also be affected by any changes in climate or by fertilization in managed forests.

Although climate change may occur and may, in a number of decades, affect the species composition of the forest, it is not considered likely to affect forestry practices during the ten-year life of the plan. Nonetheless, the draft plan incorporates a process of adaptive management (see chapter 2, Adaptive Management) permitting effective response to changing knowledge. Thus, should a scientific consensus emerge during the life of the plan, indicating that forestry practices should be modified promptly in anticipation of the effects of global warming, the BLM will be able to adjust.

Appendix S

Soil Compaction, Erosion, and Nutrient Status

Maintenance of long-term soil productivity is a basic requirement of forest management. Soil and nonsoil factors influence soil productivity. Nonsoil factors, such as climate and geology, are not influenced by forest management activities. Soil factors which can be modified by management activities are soil moisture, soil aeration, organic matter and nutrient availability. The district's soils differ in their degree of sensitivity to disturbances. Determining the suitability of specific soils for management practices is an important first step in preventing or minimizing soils-related adverse impacts.

Soil disturbance usually is an unavoidable consequence of most management activities. The type and magnitude of disturbance determine the effects on soil productivity. Timber management practices, including road construction, are the dominant management activities which create disturbances such as compaction/displacement, erosion, and loss of organic material and nutrients.

Compaction/Displacement

Soil compaction can occur on all soils. Compaction causes reduced plant growth due to reduced water infiltration, and gaseous and nutrient exchange rates. Physical resistance to root growth can occur with high soil densities. Compaction may also affect populations of soil organisms, but resultant tree growth impact is unknown.

Soil displacement may affect plant growth, depending on distance moved, by removing nutrients and soil organisms, and by reducing available water and rooting depth.

Literature reports that detrimental soil compaction and displacement has a combined effect on growth. The growth effect of each is inseparable. Detrimental soil compaction is assumed to occur at depths greater than two inches and is evidenced by an increase in soil density of 15 percent or more (U.S. Forest Service standard in Manual Supplement 45, Section 2520.4) over the undisturbed level. Most of this increase in density occurs after the first machine pass when soils are wet and after the first three to five passes when soils are relatively dry (McNabb and Froehlich 1983, Steinbrenner 1955). Power (1987) and Dymess (1965) reported that detrimental soil compaction/displacement created by ground-based yarding covered 25 percent of a harvest unit. Wert and Thomas (1981) reported Douglas-fir growth loss of 43 percent on ground-based yarding skid trails and immediately adjacent (three meters) areas that were 32 years old. Vanderheyden (1980) found no apparent compaction recovery after 38 years on a variety of soil textures in the Western Cascades of Oregon. Dymess (1967) and Ruth (1967) reported soil disturbance created by high-lead and skyline cable yarding, but tree growth impacts from cable yarding are inconclusive.

Timber harvest and site preparation methods together with soil conditions during operation influence the degree of soil compaction and displacement. The yarding system utilized during harvest affects the amount of soil disturbed. The amount of compaction/displacement created by ground-based yarding primarily depends on the amount of the area in yarding trails, soil moisture during yarding, number of passes over each trail, and amelioration practices used. The more a log is suspended during yarding with a cable system, the less the soils are disturbed. Thus skyline systems generally disrupt less than high-lead systems (Dymess 1967). The amount of soil compaction/displacement and tree growth losses created by mechanical site preparation varies with differing conditions (amount of material to be piled, soil moisture, machine type and operation, depth of organic matter layers, number of machine passes, etc.).

The amount of the area having detrimental soil compaction/displacement created by ground-based yarding can be minimized by using designated skid trails that are restricted to a predetermined percentage of the harvest unit (Froehlich et al. 1981, Garland 1982; U.S. Department of the Interior, BLM, OSO 1983). Detrimental soil compaction created by mechanical site preparation can be minimized or avoided by utilizing a tracked backhoe/excavator and/or limiting the number of passes to two (forward and back) when soils are dry and most resistant to compaction. Tillage can fracture and ameliorate compacted soil. The degree of fracturing varies with tillage equipment, machine operation, and soil and site conditions (texture, moisture, coarse fragmented content, etc.). Andrus and Froehlich (1983) reported fracturing of approximately 80 percent for properly designed winged rippers. Davis (1990) reported bulk densities of compacted areas tilled with a self-drafting winged subsoiler were not significantly different than those in uncompacted areas. Soil structure and pores are not returned to their natural condition by tillage. No research has been conducted that correlates the degree of fracturing and restoration of soil density with the restoration of growth potential.

Soil Erosion and Mass Wasting (Landsliding)

Soil is an anchoring medium for plants and a reservoir of readily available water and nutrients for plant growth. Natural surface erosion rates in undisturbed forested areas of Western Oregon are very low. Overland flow of water is rare due to the usually thick protective cover of vegetation, duff and litter, and the high infiltration rate of the soils. Surface erosion and mass wasting are two types of soil erosion that affect long-term productivity of forest soils. Both are naturally occurring geologic processes involving gravity, soil water, precipitation events, etc.

Surface soil erosion, which includes sheet, rill, gully, and dry ravelling, is the detachment and movement of individual soil particles or aggregates downslope. It is caused either by the energy of rainfall and running water acting on bare soils, or by surface disturbance of steep slopes. In some of the higher elevation areas, freezing and thawing, especially on a daily basis, can cause considerable erosion on disturbed ground. This is particularly apparent in road cutbanks and areas with exposed soil.

Mass wasting (landsliding) is the downslope movement of soil and rock material. Volume of mass wasting events can range from a few cubic feet to thousands of cubic yards. Some of the more important factors that contribute to soil/slope instability are steep gradient, low soil strength, declining root strength, shallow soil depth, road construction, and a high frequency, duration, and intensity of precipitation.

There are several distinct types of mass movement. Debris avalanches and debris torrents are similar in that both occur on steep slopes, are fast moving, and are composed of soil, rock, water, and organic material. Torrents are water charged and occur in drainages, whereas avalanches lack the high water content and may or may not occur in drainages. These are the most dangerous types of landsliding and usually produce the most dramatic effects. Various slow moving types of mass movement such as shallow earth flows, rotational slumps, and deep-seated geologic events occur and are usually initiated by excessive water. Major concerns and impacts of mass wasting are public safety, private property, roads, bridges, water quality, and fisheries (see Chapter 4, Water Resources and Fish Habitat sections).

Current road construction practices have reduced the landslide frequency rate from pre-1975 road construction practices. High-lead systems may disturb 15 to 20 percent of the harvested area (Dyrness 1967). Skyline systems generally disturb less than ten percent of the area, and aerial systems affect less than five percent of the ground (Dyrness 1967). Compaction, displacement, and mixing are the primary yarding disturbances. The significance of displacement and mixing of surface soils and organic materials on long-term productivity is unknown.

Reduction in root strength following timber harvest and site preparation activities may be a significant cause of landsliding in areas not associated with road construction. These changes match the high frequency of landslides the first few years following timber harvest on slopes with high potential for failure in Western Oregon (Burroughs and Thomas 1977). Areas most sensitive to loss of root strength and subsequent translational-type landsliding usually are over 70 percent slopes in concave positions, over hard bedrock in areas of high rainfall. Rotational-type landslides are less sensitive to the root strength factor but are sensitive to disturbances to soil and ground water and natural slope configuration.

Nutrient Status

Management of the surface organic material can strongly influence soil productivity because of the interdependence between above ground organic matter supplies and soil nutrient cycling and availability. Decaying plant components, including large downed woody debris, produce an organic layer on the soil surface which decomposes into soil organic matter. This provides plant nutrients, a supply of energy to soil microorganisms, and a medium for water storage. Soil microorganism activity has been directly linked to soil productivity (Harvey et al. 1979). Nitrogen is a limiting growth nutrient in many Pacific Northwest sites. The surface organic layer (duff) is a primary source of nitrogen for tree growth.

Soil organic matter accumulation and cycling are related to site index. When compared to lower site indices, higher sites have more organic matter incorporated into the soil and a larger nitrogen pool. Therefore, productivity is usually more resilient on higher sites. For maintenance of long-term productivity, conservation of organic matter on low sites is more important than on high sites.

Harvest and site preparation intensities and frequencies influence the amount and composition of the surface organic layer. Conservation of small materials (needles, leaves, twigs) is important for site nitrogen retention because these materials have the highest concentrations of nitrogen. When compared to needles and twigs, removal of large materials (stemwood and large branches) has less effect on total nitrogen retention. However, the large materials are important for continuation of healthy symbiotic fungi populations (Maser et al. 1978)

Soil Biology

Soil organisms work continually in carbon cycling, nutrient transfer, water availability, vegetation vigor, and maintenance of soil structure (Powers 1989). Mycorrhizal fungi enhance nutrient uptake of host plants by increasing the absorbing surface area of roots and through active physiological mechanisms (Amaranthus et al. 1989). When populations of soil organisms are healthy, few nutrients, such as nitrate, leach out of the system. The increased surface absorbing area also directly increases the total soil volume roots can explore for water.

Soil organisms are responsible for most biological fixation of nitrogen in ecosystems. Certain bacteria and actinomycetes form a mutually beneficial relationship with host plants and convert (symbiotic fixation) atmospheric nitrogen into ammonium nitrogen which is released into the host plant's roots (Amaranthus et al. 1989). Also, certain organisms that are not associated with host plants can convert atmospheric nitrogen (asymbiotic fixation). Some of these organisms are associated with wood-rotting fungi and mycorrhizal fungi (Amaranthus et al. 1989).

Mycorrhizae and other microbes affect soil structure by helping bind soil particles into water-stable aggregates which create soils with stable and adequate pore space. Soil pores are essential for adequate movement of water and air required by plant roots and soil organisms.

Data are lacking for addressing what reduces beneficial organism populations and how reduced populations affect soil productivity. Recent studies provide evidence for reasonable speculation. Long-term impacts to soil organisms can be minimized by implementing management practices that reduce soil disturbance severity, maintain organic matter levels, and emphasize revegetation by indigenous host species and associate soil organisms (Amaranthus et al. 1989)

Appendix T

FORCYTE-11 Model

The FORCYTE-11 (FORest nutrient Cycling and Yield Trend Evaluator) Model was developed in the late 1980s by Dr. J.P. Kimmins and K.A. Scoullar under contract to Forestry Canada (Kimmins and Scoullar 1990). It is a hybrid historical bioassay and ecological process-based simulation computer model that predicts forest yields. FORCYTE-11 was developed to examine the effects of altering the nutrient status of a site. FORCYTE-11 can simulate the growth, yield, and nutrient cycling in a wide variety of even-aged forests.

The Salem District has used FORCYTE-11 to estimate long-term soil productivity trends for various management practices addressed in the Sensitivity Analysis of Timber Management Prescriptions of the Preferred Alternative. The trends are only used for relative comparisons because the model has not been validated against long-term experimental data. In addition, the FORCYTE-11 model was not designed nor calibrated to model the high retention, high organic input prescriptions for Late-Successional Reserves, Adaptive Management Areas or Riparian Reserves under the proposed resource management plan. FORCYTE prescriptions were not completed for these areas.

Oregon State University's Department of Forest Science used a combination of literature and inventory data to calibrate FORCYTE-11 for western Oregon Douglas-fir sites (Sachs 1988). These data do not give a complete representation of all the ecosystem processes but are the best available at the present time. Research data indicates nitrogen is the limiting nutrient for most sites growing Douglas-fir in western Oregon. Therefore, nitrogen was the limiting nutrient used in the FORCYTE-11 simulations. Vegetative growth in FORCYTE-11 is influenced by available nitrogen.

FORCYTE-11 was used to estimate Douglas-fir total biomass production and site quality at an inherent, natural productivity level. This natural productivity level represents a baseline for comparisons of the various management prescriptions. This baseline (natural productivity level) is defined as Douglas-fir total biomass production estimated by FORCYTE-11 simulation over approximately 600 years, with maintenance of site quality and each rotation spanning a period equal to the culmination of mean annual increment. The natural productivity level was preceded by 900 years with no management practices and a fire frequency keyed to each specific management unit being analyzed. This 900-year scenario was judged to approximate natural stand dynamics prior to timber harvest and forest management. Therefore, any changes caused by management would be calculated from this baseline.

The following procedure was used for estimating nitrogen-related growth effects due to various management prescriptions:

- 1) The estimate of total Douglas-fir biomass for the inherent productivity of a natural stand growing until culmination of mean annual increment was converted to mean annual production.

Example: 4,536 metric tons / hectare produced over four 70-year (culmination of mean annual increment) rotations (280 years = evaluation timeframe).

$$\frac{4,536}{280} = 16.2 \text{ metric tons / hectare / year}$$

- 2) FORCYTE-11 was used to estimate Douglas-fir total biomass produced by various prescriptions in the Sensitivity Analysis of Timber Management Prescriptions for the Preferred Alternative. These total biomass figures were reported as mean annual production.

Example: Management prescription of 40-year rotations with no prescribed burn, no fertilization, and precommercial thinning at 13 years. 3,662 metric tons / hectare produced over six 40-year rotations (240 years = evaluation timeframe).

$$\frac{3,662}{240} = 15.3 \text{ metric tons/hectare/year}$$

3) The mean annual production estimates were used to calculate percent change from the inherent natural productivity level (baseline) for the various timber management prescription simulations.

Example:

$$\frac{15.3 \text{ (mean annual production)} - 16.2 \text{ (baseline)}}{16.2 \text{ (baseline)}} \times 100 = -6 \text{ percent}$$

4) The degree and direction of the productivity trend for each simulated timber management prescription was estimated by using the percent change from the mean annual production and the annual production from the last simulated rotation.

Example:

$$\frac{16.5 \text{ (annual production last rotation)} - 15.3 \text{ (mean annual production)}}{15.3 \text{ (mean annual production)}} \times 100 = +8 \text{ percent}$$

5) The FORCYTE-11 model tracks the limiting nutrient (nitrogen availability compared to the stand requirement for growth) through the cycles of simulated timber management prescriptions. The limiting nutrient site quality number is recorded for the end of each rotation. The average site quality for the analysis is determined. The average site quality for each prescription is used to calculate the percent change from the baseline site quality.

Example:

$$\begin{aligned} \text{Average Site Quality} = \\ \frac{120 \text{ (*site quality at end of rotation)} + 130 + 132 + 134}{4 \text{ (number of rotations)}} = 129 \end{aligned}$$

$$\begin{aligned} \text{Percent change from baseline} = \\ \frac{129 \text{ (average site quality)} - 120 \text{ (baseline site quality)}}{120 \text{ (baseline site quality)}} \times 100 = +7.5 \text{ percent} \end{aligned}$$

6) The degree and direction of the site quality trend at the end of each timber management prescription simulation was estimated by using the percent change from the average site quality and the site quality at the end of the simulation.

Example:

$$\frac{134 \text{ (site quality at end)} - 129 \text{ (average site quality)}}{129 \text{ (average site quality)}} \times 100 = +4 \text{ percent}$$

7) The percent change from the baseline level for each management prescription was categorized into the following trend classes:

Maintaining:	Change is + or - <10 percent
Increasing:	Change is + 11-20 percent
Decreasing:	Change is - 11-20 percent
Strongly Increasing:	Change is + >21 percent
Strongly Decreasing:	Change is - >21 percent

The following tables display the long-term productivity and site quality trend classes for various timber management practices that would be used under the various alternatives. The last set of tables displays long-term productivity and site quality trend classes for timber management practices anticipated under the preferred alternative.

Appendix U

Watershed Condition

Compaction (percent)

Current Condition	Projected Short-Term Watershed Condition by Alternative						
	A	B	C	D	E	PRMP ¹	Nonfederal ²
<u>Benton County</u>							
Alsea Frontal	8.3	8.6	8.4	8.3	8.2	8.2	8.1
Crooked Creek	6.3	6.2	6.2	6.4	6.3	6.2	6.2
Fall Creek	6.8	7.5	7.2	6.9	6.8	7.1	6.8
Lower Lobster Creek	7.3	7.8	7.8	7.4	7.3	7.7	7.2
Lower South Fork Alsea	9.1	9.8	10.0	9.7	9.8	9.6	9.3
North Fork Alsea	8.0	8.8	9.0	8.7	8.5	8.8	8.4
Upper Lobster Creek	6.3	6.7	6.4	6.8	6.1	6.1	6.1
Upper South Fork Alsea	8.3	8.8	8.6	8.7	8.5	8.3	8.2
<u>Polk and Lincoln County</u>							
Gooseneck Creek	9.8	10.1	10.1	10.1	10.0	10.0	10.0
Mill Creek	5.4	13.8	13.7	13.7	13.6	13.6	13.6
North Fork Siletz	9.0	11.4	11.3	11.3	11.3	11.2	11.2
Pedee Creek	14.5	15.8	15.7	15.6	15.5	15.5	15.3
Rowell-Gold Creek	10.2	10.0	10.0	10.1	9.9	9.9	9.8
Upper Rickreall Creek	7.6	12.6	12.6	12.6	12.7	12.6	12.3
<u>Tillamook and Yamhill Counties</u>							
Bear Creek (Salem)	8.5	9.2	8.9	8.5	8.4	8.8	8.4
Bible Creek	8.5	8.4	8.3	8.4	8.2	8.3	8.2
Clear Creek (Kilchis)	6.0	8.5	8.3	8.1	8.2	8.2	8.1
Elk Creek (Nestucca)	6.1	6.8	6.8	6.2	6.2	6.6	6.2
Kilchis Frontal	4.7	10.0	10.1	10.0	9.8	10.0	9.6
Moon Creek	6.4	7.4	7.2	7.2	7.1	7.2	7.1
Testament Creek	9.7	10.0	9.9	10.0	9.4	9.9	9.4
Upper Nestucca	8.3	9.4	9.3	9.0	8.9	9.2	8.9
Upper Willamina	7.6	7.9	7.8	7.6	7.6	7.8	7.5
<u>Washington and Columbia Counties</u>							
East Fork Nehalem	10.8	12.4	12.4	12.4	12.6	12.4	12.3
<u>Clackamas County</u>							
Table Rock Fork	5.5	6.9	6.9	6.5	6.6	6.6	6.5
Upper Molalla River	10.7	11.7	11.8	11.7	11.6	11.7	11.5
<u>Linn County</u>							
Quartzville Creek	8.9	8.9	8.9	8.6	8.6	8.6	8.6

¹ Compaction levels do not take into account the proactive watershed improvement projects that will be developed under this plan.

² Nonfederal: the projected compaction levels when no activity is projected on federal lands other than natural recovery.

Source: Western Oregon Digital Data Base and Salem District resource specialists.

Appendix U

Watershed Condition (continued)

Equivalent Clearcut (percent)

		Projected Short-Term Watershed Condition by Alternative						
	Current Condition	A	B	C	D	E	PRMP	Nonfederal ¹
<u>Benton County</u>								
Alsea Frontal	13.4	15.3	16.7	13.6	13.4	13.3	11.6	11.5
Crooked Creek	8.9	7.7	7.8	10.7	9.7	7.7	7.7	7.7
Fall Creek	12.3	14.2	14.3	10.2	9.4	13.1	9.4	9.3
Lower Lobster Creek	12.1	18.0	17.1	11.5	10.1	16.0	9.8	9.8
Lower South Fork Alsea	10.9	16.7	19.2	12.3	15.5	12.9	9.9	9.9
North Fork Alsea	12.2	18.2	21.7	17.0	13.3	18.9	13.3	13.3
Upper Lobster Creek	11.3	17.5	13.1	19.1	7.6	8.0	7.6	7.6
Upper South Fork Alsea	11.3	16.5	14.2	14.9	13.8	10.6	9.8	9.7
<u>Polk and Lincoln Counties</u>								
Gooseneck Creek	12.1	15.5	15.7	15.0	14.4	14.5	14.4	14.4
Mill Creek	11.8	24.7	23.3	22.7	21.0	21.2	21.0	21.0
North Fork Siletz	13.4	21.1	20.6	19.0	18.4	18.2	18.2	18.2
Pedee Creek	12.1	33.9	29.9	28.9	26.6	26.7	26.6	26.6
Rowell-Gold Creek	15.0	14.8	13.9	16.1	12.2	12.1	12.0	12.0
Upper Rickreall Creek	9.4	24.2	24.2	24.3	25.7	24.2	24.2	24.2
<u>Tillamook and Yamhill Counties</u>								
Bear Creek (Salem)	14.0	32.1	24.9	15.7	10.2	22.4	10.2	10.2
Bible Creek	15.3	14.0	13.3	13.4	9.9	13.5	9.7	9.7
Clear Creek (Kilchis)	12.3	34.2	31.4	25.4	28.8	26.5	22.8	22.8
Elk Creek (Nestucca)	12.9	26.8	25.9	11.6	10.5	20.6	10.5	10.5
Kilchis Frontal	10.0	26.9	29.5	26.0	23.9	26.3	19.5	19.5
Moon Creek	13.9	22.9	18.3	16.1	13.6	17.3	13.6	13.6
Testament Creek	17.6	27.6	25.4	22.6	10.7	23.8	10.7	10.7
Upper Nestucca	14.9	29.1	26.2	18.2	15.9	21.5	15.6	15.6
Upper Willamina	13.0	18.9	18.1	13.4	11.8	16.2	10.2	10.1
<u>Washington and Columbia Counties</u>								
East Fork Nehalem	16.0	20.5	20.5	20.8	24.4	20.4	20.5	20.2
<u>Clackamas County</u>								
Table Rock Fork	5.0	21.4	21.4	14.7	15.1	15.8	13.8	13.7
Upper Molalla River	17.2	21.1	22.0	21.0	18.3	20.1	18.4	18.3
<u>Linn County</u>								
Quartzville Creek	13.9	16.0	15.5	8.8	7.9	7.5	7.5	7.5

¹ Nonfederal: the projected equivalent clearcut area levels when no activity is projected on federal lands other than natural recovery.

Source: Western Oregon Digital Data Base and Salem District resource specialists.

Appendix V

Wildlife Analytical Techniques

Elk

Analytical Question

What method should be used to analyze impacts on Roosevelt elk habitat and populations? How should the selected model be used to analyze alternatives?

Assessment Method

Wisdom et al. Based on *A Model to Evaluate Elk Habitat in Western Oregon* 1986.

The Wisdom Model is modified to reflect the scale of planning at the forestwide level. The major modification is to drop the spacing index (HEs). The HE_r index will be calculated for BLM and non-BLM-administered lands within the analysis areas, but the HE_c and HE_f indices would be calculated only for BLM-administered lands due to the lack of vegetation data for non-BLM-administered lands.

Assumptions/Comments

- Evaluations would be conducted for each elk management area (or watershed) with substantial existing or potential elk use and where BLM has at least 25 percent ownership. Areas with less than 25 percent BLM ownership may be analyzed if BLM-administered land contributes importantly to elk management. (Future operational analyses would include 2-10,000 watersheds generated by Western Oregon Digital Data Base).
- See Wisdom et al. (p. 11) for a complete list of assumptions pertinent to use of the model.
- Use the following forest stages as a guide (ages may vary between districts due to differences in forest types and management regimes):
 - Forage areas = 0 to 20 years old
 - Hiding cover = 21 to 50 years old with appropriate stocking classes
 - Thermal cover = 51 to 160 years old with appropriate stocking classes
 - Optimal cover = Older than 160 years old with appropriate stocking classes.

Analytical Techniques

- **Road Density (HE_r):**
 - Determine miles of drivable roads within each elk management area (or watershed) for the existing condition. Divide miles of road by acres of Western Oregon Digital Data Base coverage within each area to determine road density. Compare density to the desired 1.5 mile benchmark suggested by Oregon Department of Fish and Wildlife 1990.
 - Estimate shifts in HE_r within each analysis area by reference to the Ten-Year Timber Harvest Scenario (i.e., determine proposed road construction levels over the next decade and recalculate HE_r). Estimate effects of the proposed resource management plan based on the occurrence of Late-Successional Reserves or other reserves in relation to other land allocations.
 - Write narrative to predict long-term impacts (100 years) of road construction on elk for BLM- and non-BLM-administered lands.
- **Cover Quality (HE_c):**
 - Determine the amount of optimal (O) thermal cover, thermal (T) cover, hiding (H) cover and forage (F). Individual Operations Inventory polygons have already been tagged with the above codes (i.e., O, T, H, F; refer to the HE_c attribute within the Forest Operations Inventory themes). Calculate HE_c according to

Wisdom Model. Calculate percent optimal thermal cover, percent thermal cover, percent hiding cover, and percent forage in area and compare to the Oregon Department of Fish and Wildlife benchmarks (*Forest Habitat Protection Criteria for BLM Lands*).

- Estimate shifts in HE_c and cover and forage percentages within each analysis area by reference to the Ten-Year Timber Harvest Scenario. Estimate effects of the proposed resource management plan based on the occurrence of Late-Successional Reserves or other reserves in relation to other land allocations.
- Write narrative to predict long-term impacts (100 years) on HE_c and cover and forage percentages for BLM-administered lands.
- **Forage Quality (HE_f):**
 - Use HE_f attribute in Forest Operations Inventory theme to determine acres of forage by quality classes as described in Wisdom Model (p. 29).
 - Calculate HE_f Index according to Wisdom Model.
 - Estimate shifts in HE_f within each analysis area by reference to the Ten-Year Timber Harvest Scenario. Estimate effects of the proposed resource management plan based on the occurrence of Late-Successional Reserves or other reserves in relation to other land allocations.
 - Write narrative to predict long-term impacts (100 years) on HE_f for BLM-administered lands.

Display Technique

Display road density (or HE_c), HE_f , HE_{cb} , and percentages of O, T, H, F for each elk management area (or watershed) for existing condition and at end of ten years (see below).

Snags

Analytical Question

What method should be used to predict the number of snags that would be available for each alternative and how this relates to changes in population levels of cavity-users?

Assessment Method

Neitro et al. method to analyze multiple species snag requirements (described in *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington* edited by E. Reade Brown, 1985).

Assumptions

- Method assumes that by managing for dominant woodpeckers, requirements of other cavity users will be fulfilled.
- Method assumes direct correlation between snag densities and population densities of cavity users.
- Method assumes the following minimum guidelines have been established for most alternatives (except alternatives where minimum standards of Oregon Forest Practices Act rules apply):
 - Wildlife trees will be greater than 10 inches diameter at breast height (dbh) and at least 20 feet tall; no more than five percent of the trees left will be under 15 inches dbh, at least five percent of the trees left will be over 30 inches dbh, and the remainder will be over 15 inches dbh.
 - Leave all soft snags except where they are unacceptable for safety, logging systems, or burning considerations.
 - Leave hard snags, or green trees if needed for snag mitigation purposes, both to provide the current needs of hard-snag-dependent species, and to serve as a source of future soft snags.
 - Distribute hard snags according to the following criteria: in harvest units, retain the number of hard snags or green trees to support the desired population of dominant woodpeckers (individually scattered or in clumps larger than two acres); retain all hard snags in areas reserved from timber harvest (e.g., unsuitable woodland, protected old growth/spotted owl, riparian, bald eagle).

Analytical Techniques

- Estimate existing snag levels for each forest age class. These snag levels may be estimated from projections of snag densities measured on timber inventory plots (or by using other data already collected including snag data from literature sources). Snag densities were determined for the following conifer age classes: 1 to 30 years, 40 to 80 years, 90 to 190 years, and older than 200 years. Hardwood stands are also being measured. See BLM's *Forest Inventory Field Instructions for Western Oregon* for further details. Snag densities for other habitats such as nonsuitable woodlands and riparian management areas may be estimated from timber inventory plots (or by use of other data if available) if age classes are known.
- Estimate snag densities for each age class for the range of alternatives (see the following chart) after evaluating the strategy of each alternative to provide habitat for cavity dwellers.
- Convert calculated snag densities into districtwide estimates of potential population levels (percent of maximum potential population levels) of dominant woodpeckers for each alternative (see Neitro et al., p. 145).
- Conduct analysis for short term and long term (100 years).
- In a narrative, discuss cumulative effects of the alternatives on cavity-users.

Calculation of Snag Densities (long-term example)

Age Class (years)	Existing Condition		Alternative A				Alternative D		
	Acres	Snags/ Acre	Total Snags	Acres	Snags/ Acre	Total Snags	Acres	Snags/ Acre	Total Snags
0-30	3,000	1	3,000	9,000	0	0	8,000	1	8,000
40-80	10,000	1	10,000	10,000	1	10,000	8,000	2	16,000
90-190	5,000	2	10,000	500	2	1,000	2,000	2	4,000
200+	2,000	3	6,000	500	3	1,500	2,000	3	6,000
Totals	20,000		29,000	20,000		12,500	20,000		34,000
Snag density for entire forest (number / acre)									
	29,000/20,000 = 1.5				0.6			1.7	

Source: Salem District wildlife files.

Display Technique

Display estimated population levels of dominant woodpeckers at end of 10 and 100 years as indicated below.

Estimated Population Levels (percent of maximum potential) of Dominant Woodpecker Populations at End of Ten Decades (example)

Existing Populations	Alternatives							
	NA	A	B	C	D	E	F	PRMP
40	40	20	30	40	60	60	60	greater than 60

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Salem District wildlife files.

Appendix W

Possible Management Activities and Major Consequences in Existing and Potential Special Areas

Possible Management Activities and Major Consequences

Existing Special Areas

Big Canyon ACEC / ONA

- **Alternative No Action.** High potential for energy and minerals occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: natural values could be lost or damaged if mineral activity occurs.
- **Alternative A.** Sixty-five acres of timber harvest included in the ten-year scenario; high potential for energy and minerals occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values could be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area and proposal to control surface mineral activity; some additional protection in the surrounding area due to 35 percent basal area retention (alternative C) and visual resource management class II (alternative E). Consequences: natural values would be protected.
- **Alternative PRMP.** Natural values protected by Late-Successional Reserve and Riparian Reserve allocations; high potential for energy and minerals occurrence. Consequences: If the area is not withdrawn, values might be lost or damaged if energy and mineral development occurs.

Carolyn's Crown ACEC / RNA

- **Alternative No Action.** High potential for minerals occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: natural values could be lost or damaged if mineral activity occurs.
- **Alternative A.** Forty-nine acres of timber harvest included in the ten-year scenario; high potential for minerals development; available for road construction, off-highway vehicle use, etc. Consequences: natural values would be lost.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area and proposal to control surface mineral activity; some additional protection in the surrounding area due to restoration and retention block and 35 percent basal area retention (alternative C), habitat conservation area (alternative D), and habitat protection allocation (alternative E). Consequences: Natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: Natural values would be protected.

Elk Creek ACEC

- **Alternative No Action.** Moderate potential for mineral occurrence; continued designation as an area of critical environmental concern; no timber harvest in primary habitat; timber harvest would occur in secondary habitat; other uses controlled. Consequences: wildlife values could be lost if mineral development occurs.
- **Alternatives A and B.** Primary bald eagle habitat protected by critical habitat designation (alternative A), by

area of critical environmental concern designation (alternative B) and by proposal to control surface mineral activity; timber harvest would occur in secondary habitat (587 acres in alternative A and 330 acres in alternative B); other uses controlled. Consequences: wildlife values minimally protected.

- **Alternative C.** Primary habitat protected by area of critical environmental concern designation and proposal to control surface mineral activity; secondary habitat partially protected by restoration and retention block and 35 percent basal area retention. Consequences: wildlife values protected.
- **Alternative D.** No commodity development activities in primary or secondary habitat due to habitat conservation area allocation and proposal to control surface mineral activity. Consequences: wildlife values fully protected.
- **Alternative E.** Primary and secondary habitat protected by area of critical environmental concern designation and proposal to control surface mineral activity. Consequences: wildlife values fully protected.
- **Alternative PRMP.** Primary habitat protected by area of critical environmental concern and Late-Successional Reserve designations and proposal to control surface mineral activity. Consequences: wildlife values protected.

Grass Mountain ACEC / RNA

- **Alternative No Action.** Moderate potential for energy occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/research natural area. Consequences: natural values could be lost or damaged if mineral activity occurs.
- **Alternative A.** 34 acres of timber harvest included in the ten-year scenario; moderate potential for energy occurrence; grass bald available for road construction, off-highway vehicle use, etc. Consequences: botanical values would be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block (alternative C), and habitat conservation area (alternative D). Consequences: botanical values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: botanical values would be protected.

High Peak-Moon Creek ACEC / RNA

- **Alternative No Action.** Moderate potential for energy occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/research natural area. Consequences: natural values could be lost or damaged if energy development occurs.
- **Alternative A.** 871 acres of timber harvest included in the ten-year scenario; moderate potential for energy; available for road construction, off-highway vehicle use, etc. Consequences: natural values would be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block and 35 percent basal area retention (alternative C), and habitat conservation area (alternative D). Consequences: Natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: Natural values would be protected.

Larch Mountain Environmental Education Site

- **Alternative No Action.** Allocated as environmental education site but available for timber harvest, mineral entry, etc.; moderate potential for energy occurrence. Consequences: educational values could be lost or damaged if harvest or mineral development occurs.
- **Alternative A.** No acres of timber harvest included in the ten-year scenario but timber could be harvested in the future; moderate potential for energy occurrence; available for road construction, off-highway vehicle use,

etc. Consequences: natural values would be lost or damaged if timber harvest or energy development occurs.

- **Alternatives B through E and PRMP.** No commodity development activities due to continued designation as an environmental education site and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C), visual resource management class II (alternative D) and habitat protection allocation (alternative E). Consequences: natural values would be protected.

Little Grass Mtn. ACEC / ONA

- **Alternative No Action.** Moderate potential for energy occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: natural values could be lost or damaged if energy development occurs.
- **Alternative A.** Fourteen acres of timber harvest included in the ten-year scenario; moderate potential for energy occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values would be lost or damaged if timber harvest or energy development occurs.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C), and habitat conservation area (alternative D), habitat protection allocation (alternative E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: natural values would be protected.

Little Sink ACEC / ONA

- **Alternative A.** No commodity development activities due to interim protection as an instant wilderness study area; congressional decision could open part of the area for development, but fragile areas would not be disturbed. Consequences: natural values protected pending congressional decision.
- **Alternatives No Action, and B through E.** No commodity development activities due to continued mineral withdrawal and designation as an area of critical environmental concern/research natural area. Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued mineral withdrawal and designation as an area of critical environmental concern/research natural area and allocation as Late-Successional Reserve. Consequences: natural values would be protected.

Lost Prairie ACEC

- **Alternative No Action.** Moderate potential for energy occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: botanical values could be lost or damaged if energy development occurs.
- **Alternative A.** No acres of timber harvest included in the ten-year scenario; could possibly be reforested and harvested in the future; moderate potential for energy occurrence; available for road construction, off-highway vehicle use, etc. Consequences: botanical values would be lost or damaged.
- **Alternatives B through E and PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern and proposal to control surface mineral activity. Consequences: botanical values would be protected.

Marys Peak ACEC / ONA

- **Alternative No Action.** Moderate potential for energy and mineral occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: botanical values could be lost or damaged if energy and mineral development occurs.
- **Alternative A.** Ten acres of timber harvest included in the ten-year scenario; moderate potential for energy and minerals occurrence; available for road construction, off-highway vehicle use, etc. Consequences:

botanical values would be lost or damaged if timber harvest or energy and mineral development occurs.

- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C), and habitat conservation area (alternative D), habitat protection allocation (alternative E). Consequences: botanical values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: botanical values would be protected.

Middle Santiam Terrace ACEC

- **Alternative No Action.** Moderate potential for mineral occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: natural values could be lost or damaged if mineral development occurs.
- **Alternative A.** Area available for timber harvest; moderate potential for mineral occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values lost or damaged.
- **Alternatives B through E and PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C) and habitat protection allocation (alternative E). Consequences: natural values would be protected.

Nestucca River ACEC

- **Alternative A.** 1,423 acres of timber harvest included in the ten-year scenario; closed to mineral development on the surface; available for road construction, off-highway vehicle use, etc. Consequences: narrow riparian buffer (75 feet) would not provide adequate protection for recreation, visual and fishery values.
- **Alternatives No Action and B.** No commodity development in primary zone; timber harvest planned in secondary zone (710 acres in ten-year scenario for alternative B). Consequences: activity in the secondary zone could have adverse impacts on recreation, visual and fishery values in the primary zone.
- **Alternative C.** Same as No Action and B except 35 percent basal area retention would provide some additional protection in the lower part of the area of critical environmental concern. Consequences: similar to B and No Action.
- **Alternatives D and E.** No commodity development activities due to habitat conservation area allocation under alternative D and total protection of area of critical environmental concern under alternative E. Consequences: recreation, visual and fishery values would be protected.
- **Alternative PRMP.** No commodity development in primary zone of existing area of critical environmental concern; surrounding area allocated as Late-Successional Reserve. Consequences: recreation, visual and fishery values would be protected.

Rickreall Ridge ACEC

- **Alternative No Action.** Moderate potential for energy and mineral occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area. Consequences: botanical values could be lost or damaged if energy and mineral development occurs.
- **Alternative A.** No acres of timber harvest included in the ten-year scenario but could possibly be reforested and harvested in the future; moderate potential for energy and minerals occurrence; available for road construction, off-highway vehicle use, etc. Consequences: botanical values would be lost or damaged if timber management or energy and mineral development occurs.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block and 35 percent basal area retention (alternative C), habitat conservation area (alternative D), and habitat protection allocation (alternative E). Consequences: botanical values would be protected.

- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: botanical values would be protected.

Saddleback Mtn. ACEC / RNA

- **Alternative No Action.** Moderate potential for energy occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/research natural area. Consequences: botanical values could be lost or damaged if energy development occurs.
- **Alternative A.** 112 acres of timber harvest included in the ten-year scenario; moderate potential for energy occurrence; available for road construction, off-highway vehicle use, etc. Consequences: botanical values would be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block (alternative C), and visual resource management class II (alternative E). Consequences: botanical values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: botanical values would be protected.

Sandy River Gorge ACEC / ONA

- **Alternative No Action.** Open to mineral entry but low potential for occurrence; otherwise, protected by continued area of critical environmental concern/outstanding natural area designation. Consequences: none anticipated.
- **Alternative A.** No acres of timber harvest included in the ten-year scenario but could be harvested in the future; low potential for energy and minerals occurrence; available for road construction, off-highway vehicle use, etc. Consequences: recreational and natural values could be lost or damaged.
- **Alternatives B through E, and PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area and proposal to control surface mineral activity. Consequences: recreational and natural values would be protected.

Sheridan Peak ACEC

- **Alternative No Action.** Moderate potential for energy and mineral occurrence; otherwise, limited commodity development activities due to continued designation as an area of critical environmental concern/research natural area. Consequences: botanical values could be lost or damaged if energy and mineral development occurs.
- **Alternative A.** 178 acres of timber harvest included in the ten-year scenario; moderate potential for energy and minerals occurrence; available for road construction, off-highway vehicle use, etc. Consequences: botanical values could be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation and protection as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block and 35 percent basal area retention (alternative C) and habitat conservation area (alternative D). Consequences: botanical values would be fully protected.
- **Alternative PRMP.** No commodity development activities due to continued designation and protection as an area of critical environmental concern, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: botanical values protected.

Soosap Meadows ACEC

- **Alternative No Action.** Low potential for energy and mineral occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern. Consequences: none anticipated.

- **Alternative A.** Twenty-nine acres of timber harvest included in the ten-year scenario; low potential for energy and mineral occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block (alternative C) and habitat protection allocation (alternative E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: natural values would be protected.

The Butte ACEC / RNA

- **Alternative No Action.** Moderate potential for energy occurrence; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern/research natural area. Consequences: natural values could be lost or damaged if energy development occurs.
- **Alternative A.** 38 acres of timber harvest included in the ten-year scenario; moderate potential for energy occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values would be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C) and visual resource management class II (alternatives D and E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/research natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: natural values would be protected.

Valley-of-the-Giants ACEC / ONA

- **Alternative No Action.** Mineral estate held by private company; moderate potential for energy occurrence; otherwise, area protected by continued designation as area of critical environmental concern/outstanding natural area. Consequences: natural values could be lost or damaged if energy development occurs.
- **Alternative A.** Seventeen acres of timber harvest included in the ten-year scenario; moderate potential for energy occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values would be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block (alternative C), habitat conservation area (alternative D), and habitat protection allocation (alternative E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern/outstanding natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: natural values would be protected.

Willamette River Parcels

- **Alternative No Action.** High potential for energy occurrence; otherwise, parcels protected by continued designation as Willamette River Greenway. Consequences: river values could be damaged if energy development occurs.
- **Alternative A.** High potential for energy occurrence; proposal to control surface mineral activity; continued protection as part of greenway. Consequences: none anticipated.
- **Alternatives B through E, and PRMP.** No commodity development activities due to continued protection as part of greenway. Consequences: natural values would be protected.

Williams Lake ACEC

- **Alternative No Action.** Low potential for energy occurrence; development; otherwise, no commodity development activities due to continued designation as an area of critical environmental concern. Consequences: none anticipated.
- **Alternative A.** Thirty-four acres of timber harvest included in the ten-year scenario; low potential for energy occurrence; available for road construction, off-highway vehicle use, etc. Consequences: natural values would be lost or damaged.
- **Alternatives B through E, and PRMP.** No commodity development activities due to continued designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C) and habitat protection allocation (alternative E). Consequences: natural values would be protected.

Yaquina Head ACEC / ONA

- **All Alternatives.** Area being developed to enhance public enjoyment of natural values. Consequences: natural values would be protected.

Potential Special Areas

A.J. Dwyer Corridor

- **All Alternatives.** Area protected as part of Wildwood Recreation Site, which is protected as a high use site under all alternatives.

Alsea Bay Island Potential ACEC

- **Alternatives No Action.** No special protective designation so the area is available for commodity development; high potential for energy occurrence. Consequences: possibility of development is slight; state of Oregon protection as an estuarine resource should be sufficient.
- **Alternatives B through E.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity. Consequences: natural values would be protected.
- **Alternative PRMP.** Area allocated as Riparian Reserve. Consequences: natural values would be protected.

Crabtree/Shafter Creek Potential ACEC / RNA / ONA

- **Alternative No Action.** No special protective designation so the area is available for commodity development; high potential for mineral occurrence. Consequences: possibility of development is likely; natural values would be lost or damaged.
- **Alternative A.** 71 acres of timber harvest included in alternative A ten-year scenario; high potential for mineral occurrence. Consequences: natural values would be lost or damaged.
- **Alternatives B through E.** No commodity development activities due to designation as an area of critical environmental concern/research natural area/outstanding natural area and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block and 35 percent basal area retention (alternative C), habitat conservation area (alternative D), and habitat protection allocation (alternative E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to designation as an area of critical environmental concern/research natural area/outstanding natural area, allocation as Late-Successional Reserve, and proposal to control surface mineral activity

Eagle Creek Potential Watershed Protection Area

- **Alternatives No Action and A through D.** No special protective designation so the area is available for timber harvest; closed to mineral development activity on surface. Consequences: possibility of harvest is likely; watershed and fishery values would be damaged.

- **Alternative E.** No commodity development activities due to allocation as a special area; closed to mineral development activity on surface. Consequences: watershed and fishery values would be protected.
- **Alternative PRMP.** Identified as a Tier 2 Key Watershed. Watershed analysis will be required prior to management activities. Consequences: watershed conditions will be enhanced and maintained.

Forest Peak Potential ACEC

- **Alternative No Action.** No special protective designation so the area is available for commodity development; moderate potential for energy occurrence. Consequences: possibility of development likely; natural values may be lost or damaged.
- **Alternatives A and B.** 85 acres (alternative A) and 78 acres (alternative B) of timber harvest included in the ten-year scenarios; moderate potential for energy occurrence. Consequences: natural values would be lost or damaged.
- **Alternatives C through E.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C) and visual resource management class II (alternatives D and E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to designation as an area of critical environmental concern, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: natural values would be protected.

North Santiam Potential ACEC

- **Alternative No Action.** No special protective designation so the area is available for commodity development or disposal; moderate potential for energy occurrence. Consequences: possibility of development or disposal likely; natural values may be lost or damaged.
- **Alternatives A and B.** 24 acres of timber harvest included in the alternative A and B ten-year scenarios; moderate potential for energy occurrence. Consequences: natural values would be lost or damaged.
- **Alternatives C through E and PRMP.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity. Consequences: natural values would be protected.

Walker Flat Potential ACEC

- **Alternatives No Action, A and B.** No special protective designation so the area is available for commodity development; moderate potential for energy and mineral occurrence. Consequences: botanical values could be lost or damaged if energy and mineral development occurs.
- **Alternatives C through E and PRMP.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C), habitat conservation area (alternative D) and riparian management area (alternative E). Consequences: botanical values would be protected.

Wells Island Potential ACEC

- **Alternatives No Action and PRMP.** Area included in the Willamette River Greenway and a Riparian Reserve under the proposed resource management plan; protected from most commodity development; high potential for energy occurrence. Consequences: slight possibility of development; state of Oregon protection of the area as a riparian and recreation resource should be sufficient.
- **Alternatives A through E.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity. Consequences: riparian and recreation values would be protected.

White Rock Fen Potential ACEC

- **Alternative No Action, A and B.** No commodity development due to wetland values. Consequences: natural values would be protected.

- **Alternatives C through E.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C), habitat conservation area (alternative D), and habitat protection allocation (alternative E). Consequences: natural values would be protected.
- **Alternative PRMP.** No commodity development activities due to designation as an area of critical environmental concern, allocation as Late-Successional Reserve, and proposal to control surface mineral activity. Consequences: natural values would be protected.

Wilhoit Springs Potential ACEC

- **Alternative No Action.** No special protective designation so the area is available for commodity development; high potential for mineral occurrence. Consequences: possibility of development is likely; natural values may be lost or damaged.
- **Alternatives A and B.** Available for timber harvest (46 acres of harvest in the alternative A ten-year scenario); high potential for mineral occurrence. Consequences: natural values would be lost or damaged.
- **Alternatives C through E and PRMP.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to 35 percent basal area retention (alternative C), visual resource management class II (alternative D), and habitat protection allocation (alternative E). Consequences: natural values would be protected.

Yampo Potential ACEC

- **Alternatives No Action, A and B.** No special protective designation so the area is available for commodity development; high potential for energy occurrence. Consequences: natural values would be lost or damaged if mineral development occurs.
- **Alternatives C through E and PRMP.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity. Consequences: natural values would be protected.

Yellowstone Creek Potential ACEC

- **Alternative No Action.** No special protective designation so the area is available for commodity development; moderate potential for mineral occurrence. Consequences: possibility of development is likely; visual resources would be adversely impacted if development occurs.
- **Alternatives A and B.** Seventy-nine acres of timber harvest in the alternative A ten-year scenario and 53 acres in alternative B; moderate potential for mineral occurrence. Consequences: visual resources of the area may be adversely impacted due to narrow riparian management area and possibilities of timber blow down and mineral development.
- **Alternatives C through E.** No commodity development activities due to designation as an area of critical environmental concern and proposal to control surface mineral activity; some additional protection in surrounding area due to restoration and retention block (alternative C), habitat conservation area (alternative D), and habitat protection allocation (alternative E). Consequences: visual resources would be protected.
- **Alternative PRMP.** Limited commodity development activities due to allocation as a Riparian Reserve and Late-Successional Reserve and proposal to control surface mineral activity. Consequences: visual resources would be protected.

ACEC	=	Area of Critical Environmental Concern
ONA	=	Outstanding National Area
RNA	=	Research Natural Area
PRMP	=	Proposed Resource Management Plan

Appendix X

Effects of Silvicultural Practices and Silvicultural Systems on Wood Quality, Timber Yields and Economic Value¹

This appendix describes the effects of intensive silvicultural practices on wood quality, timber yield and economic value, alone and sequenced together in silvicultural systems.

A variety of silvicultural practices are employed in the management of forest stands. The BLM in western Oregon classifies precommercial thinning, commercial thinning, forest fertilization, and pruning as intensive silvicultural practices. These practices are applied to forest stands to meet management objectives such as obtaining desired species composition, regulating stand density, and promoting growth or stem quality of selected trees. Intensive practices are usually scheduled in a sequence, i.e. a silvicultural system or prescription over the course of a planned rotation.

Wood quality is defined as the suitability of the harvested material for a particular use and is determined from both the characteristics of the trees (tree form, ring width, limbliness, and percent of juvenile wood) and from the physical properties of the wood (specific gravity, fibril angle, and permeability). Log or tree size alone does not determine quality, but larger trees generally have more clear (knot-free) wood and a smaller portion of the stem in juvenile wood.

Timber yield is defined as the total amount of merchantable wood produced and harvested over a rotation. It is usually measured in cubic feet or board feet. Yields in this appendix are expressed in terms of net cubic foot volume or as change in cubic volume.

Economic value refers to the monetary worth of individual timber products or the net return on investment for individual silvicultural practices or sequences of practices. Economic value is affected by the quantity and quality of timber harvested as well as by the timing of costs and revenues.

Effects of Individual Silvicultural Practices

This section describes the effects of forest management actions on timber yields, wood quality, and wood value.

Uniformity and rate of growth affect the machinability and appearance of lumber. Rate of growth is a limiting factor in high-quality structural grades of lumber. Wood must have no less than four rings per inch to meet the criteria for select structural lumber. Specialty items such as scaffolds, joints, and beams must average more than six rings per inch. However, analysis of past problems with wood from managed stands has indicated that lack of strength resulted most often from a high percentage of juvenile wood, rather than from excessive growth rates. In unmanaged stands of mature Douglas-fir, juvenile wood typically occupies the first 15 to 25 rings. A higher proportion of juvenile wood could be expected in wood from stands managed on short rotations.

In general, the effects of individual silvicultural practices on timber yield vary depending on the timing and intensity of the treatment, whether treatment is solitary or in combination with other practices.

Thinning

Thinning is a silvicultural practice used to meet stand density, species composition and stand diversity objectives. Thinnings conducted prior to the time trees are considered to be of nominal merchantable size are called pre-commercial thinnings. Thinnings that remove merchantable products are designated commercial thinnings.

¹ More details of the unpublished analyses described in this appendix are available from the Medford and Roseburg BLM District offices.

The principal objectives of precommercial thinning are to provide more room for individual trees to maintain good growth rates (permitting earlier production of merchantable trees), to influence stand species composition, and to manage stand density so that stable, windfirm trees with good live crown ratios are produced. Precommercial thinning can also permit greater realization of yield benefits from genetic improvement and forest fertilization by redirecting growth potential to selected crop trees. To be fully effective, precommercial thinning must be scheduled at the correct time in a stand's development (Reukema 1975). This is usually before the onset of significant inter-tree competition, about 10 to 15 years of age in this area.

Commercial thinnings are timber harvests scheduled any time after a stand reaches a combination of stem diameter and harvestable volume per acre which permit an economically viable harvest. Commercial thinning can be effective in increasing recoverable timber yields by harvesting trees which would otherwise die prior to the final regeneration harvest in stands as old as 150 years (Williamson and Price 1971, Williamson 1982). In addition, studies have shown that heavy commercial thinning can accelerate the development of old-growth stand characteristics in existing even-aged stands (Newton and Cole 1987).

For both precommercial and commercial thinning, extremely low post-thinning densities can reduce wood quality by increasing taper and slope of wood grain, widening the annual growth rings, increasing the percentage of juvenile wood, and increasing the persistence of limbs. Thinning to wide spacings can cause both live and dead limbs to be retained much longer than in closely-spaced stands. The resulting knots and the distorted wood around them significantly reduce both wood strength and the proportion of the wood that is graded for appearance characteristics such as selects and shop grades (Maguire et al. 1991). Low post-thinning densities can also reduce timber yield by not maintaining enough trees to take advantage of full site-growth capacity in the short term (Curtis and Marshall 1986).

Fertilization

Fertilizer is applied to forest stands to offset limiting supplies of nutrients in the soil, particularly nitrogen. Fertilization treatments are usually scheduled with thinning treatments and are spaced 15 to 25 years apart.

For most conifer stands in this area, studies show that fertilization treatments can significantly accelerate stand development and increase timber yields (Miller et al. 1988). Because fertilizer applications increase individual tree vigor and the rate at which tree crowns expand, the treatment helps reduce thinning shock, accelerates the rate at which the trees expand to fully occupy the site, and makes stands more resistant to damage from insects and drought.

Fertilization has been shown to increase ring width and decrease wood specific gravity by an average of five percent (Megraw 1986). However, this is not thought to have a significant effect on wood quality. Fertilization also increases piece size (log diameter) significantly. When treatment is timed to occur after precommercial thinning and pruning, fertilization helps to increase the ratio of mature wood to juvenile wood and promotes production of clear wood.

Pruning

Pruning is carried out to improve wood quality through the production of clear wood on rotations shorter than what would be required to take advantage of natural pruning in dense stands. Pruning also helps to avoid the production of wood with loose knots. Pruning is essential to production of significant amounts of clear wood in intensively managed stands of Douglas-fir under normal even-aged management and short rotations (Cahill et al. 1988, Fight et al. 1988). Pruning may also help to meet structural diversity objectives and to decrease fire hazard in areas with short natural fire return intervals. Pruning appears to be necessary to produce significant wood of acceptable quality from lower density stands (Briggs and Fight 1992).

Results of an analysis by the Medford BLM District on product value increase from pruning Douglas-fir are shown in table X-1.

Table X-1 Effect of Pruning on Douglas-fir Wood Quality

Harvest Age	Percent Select Lumber		Value of Logs		Gain in NPV ¹ per tree
	Unpruned	Pruned	Unpruned	Pruned	
60	0 percent	35 percent	\$82	\$110	\$4.25
100	0 percent	51 percent	\$130	\$188	\$0.36

NPV = net present value using a 4 percent discount rate

A financial analysis of pruning Douglas-fir and ponderosa pine was done by Fight et al. (1993). Their results showed that pruning for both species would show positive economic returns where and when properly implemented. Future real price increases for higher quality product grades were not necessary to achieve positive economic returns.

Pruning can decrease timber yields if an excessive portion of the live tree crown is removed (O'Hara 1991). BLM does not propose levels of live crown removal that are likely to impact timber yields. BLM pruning operations are expected to have a neutral effect on timber yields.

Effects of Silvicultural Systems

This section summarizes the results of an analysis of timber yield and wood quality effects on economic return for selected silvicultural systems proposed for the proposed resource management plan. Silvicultural systems affect wood quality, timber yields and economic return by changing tree and stand growth patterns and the magnitude of discounted costs and benefits. The silvicultural systems analyzed are representative of management regimes proposed for the next decade on BLM-administered lands classified as General Forest Management Area on this district. This analysis portrays results which reflect average stand conditions and average response to treatments for BLM-administered lands in western Oregon. The actual silvicultural systems employed will vary somewhat within and between districts.

Effects of the different management practices and combinations are depicted as percent change in timber yield, percent change in net present value (NPV), NPV, benefit cost ratios, and value per unit (100 cubic feet) of timber yield.

Silvicultural Systems Analyzed

Table X-2 describes the various silvicultural systems analyzed. Analysis was limited to silvicultural systems incorporating precommercial thinning, commercial thinning, forest fertilization, and pruning compared to a base prescription which represents an overstocked stand with no treatments until a final regeneration harvest.

Table X-2 Summary of Silvicultural Prescriptions Analyzed

Silvicultural System	Description
BASE	Overstocked (overdense) stand averaging 680 trees per acre at age of establishment. Final regeneration harvest at age 60 or 100.
PCT	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Final regeneration harvest at age 60 or 100.
PCT/FERT	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Fertilizer applied at ages 30 and 45. Final regeneration harvest at age 60 or 100.
PCT/CT ¹	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Commercial thinning at age 45. Final regeneration harvest at age 60. Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Commercial thinning at ages 45 and 65. Final regeneration harvest at age 100.
PCT/FERT/CT ¹	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Fertilizer applied at ages 30 and 45. Commercial thinning at age 45. Final regeneration harvest at age 60. Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Fertilizer applied at ages 30 and 45. Commercial thinning at ages 45 and 60. Final regeneration harvest at age 100.
PCT/PRUNE	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Pruned 80 trees/acre at age 25. Final regeneration harvest at age 60 or 100.

¹ Silvicultural systems with two descriptive approaches are dependent on assumed rotation lengths. Variations in exact timing of practices will vary by district.

Analytical Assumptions

Following are the specific assumptions made in the analysis.

1. Differences in site productivity can significantly affect yields and financial returns (Koss and Scott 1978). BLM in western Oregon manages twelve planning units designated as Sustained Yield Units (SYU). Site quality is variable both within and between SYU's. Due to the complexity of trying to analyze each SYU separately, the Douglas SYU of the Roseburg District was selected as representative for BLM administered lands in western Oregon. Average productivity expressed as site index for this SYU is 100 using Hann-Scrivani site index curves (Hann and Scrivani 1987). Site Index 100 is the approximate mid-point of average site indexes used by the westside BLM districts for decadal planning purposes in estimating timber yields.
2. The costs for stand establishment treatments were derived from 1989 Roseburg BLM District contract cost data sources weighted by the percent of acres receiving the treatment. Logging and hauling costs were derived from tabular information compiled by the Medford BLM District for general westside BLM use in feasibility analysis for resource management planning.
3. An inflation rate of zero (0) and no future real increase in wood value was assumed. A discount rate of 4 percent was used.
4. The costs of establishing the current stand were not included in this analysis. However, the costs of establishing the next stand were included at the end of the assumed rotations. This convention is consistent with economic analyses done previously for BLM planning purposes in western Oregon².

² "Economic Efficiency of Intensive Management Practices for the Douglas SYU" 1991; unpublished report on file at Roseburg BLM District office.

5. Comparisons of effects were made at rotation (regeneration harvest) ages of 60 and 100 years, depending on silvicultural system. 60 years represents probable average statewide minimum rotation ages for BLM. 100 years represents the probable average BLM rotation age if culmination of mean annual increment is used as the rotation age criteria. (Curtis 1992, Curtis and Marshall 1993).
6. Intangible or intrinsic values (Smith 1987) such as the potential value of practices for meeting non-timber objectives were considered beyond the scope of the analysis.
7. Pruning analysis was performed using the addition of select pricing for lumber grades and veneer. Pruning of the first 17.5 feet (16 feet merchantable log) was assumed to occur at age 25.
8. All gross yield outputs from the SWO-Organon growth simulator model were reduced for stocking irregularity, insects and disease, defect and breakage and effects of green-tree retention at a level of seven large conifers per acre.
9. Timber products harvested were assumed to be a mixture of lumber and veneer. Lumber prices used in the TreeVal+ program were derived by taking 1989 table 9 figures shown in Warren (1993). TreeVal+ veneer prices were derived from reviewing Random Lengths publications (Nov. 1992 - Aug. 1993). The use of 1993 veneer pricing instead of associated 1989 values was required due to the lack of readily available data sources.

Analytical Models

Future timber yields and wood quality tree characteristic outputs for managed stands were obtained from simulations using the System-1 young stand model, Version 1.8 (Ritchie et al. 1991) and the SWO-Organon growth and yield model Version 4.0 (Hann et al. 1992).

System-1 is an individual tree, distance-independent growth model. It is suitable for modeling growth of trees from a minimum of three years of age up to an age of 15 to 20 years, which are then ready for entry into growth models suitable for older stands such as SWO-Organon.

SWO-Organon is an individual tree, distance-independent growth and yield model. It was developed from sampling plots located in the mixed conifer zone of southwestern Oregon. The model was developed primarily to simulate the growth and timber yield of Douglas-fir and mixed conifer stands. The model was designed to allow projections of both even-aged and uneven-aged stand conditions under different silvicultural systems.

Wood value and economic analysis were analyzed using the TreeVal+ (Sachet et al. 1989), DF Prune (Fight et al. 1992), and Forestry Investment Program (Ikahelmo 1990) models. The first two programs provide product recovery plus value data and partial cost data to the third model for an integrated economic analysis.

TreeVal+ is an analysis program which calculates tree or stand values based on predicted product recovery. TreeVal+ is appropriate for natural stands or managed plantations. Values of products harvested under the different regimes simulated were obtained from the TreeVal+ program.

DF Prune is a spreadsheet program designed to estimate the financial return from pruning coast Douglas-fir. Values of products harvested under regimes where pruning is simulated were obtained from the DF Prune program.

The Forestry Investment Program is a financial analysis program specifically developed for the economic evaluation analysis of silvicultural regimes. The Forestry Investment Program utilizes data inputs from SWO-Organon, TreeVal, DF Prune and other sources in calculations of net present values. The analysis can be structured to account for inflation, cost changes and product value changes over time.

Results of Silvicultural Systems Analysis

Table X-3 and X-4 show the effects on timber yield and economic returns for the different silvicultural systems for rotation ages of 60 and 100 years after stand initiation. Wood quality change is not directly displayed but is expressed in the economic measures.

Percent change in cubic volume is the net timber yield increase above that of the base silvicultural system expressed as percent of net conifer cubic volume. Net present value (NPV) is calculated by subtracting discounted costs of producing timber from the discounted revenues from harvest. Percent change in NPV is the change in NPV relative to the NPV of the base silvicultural system. The benefit cost ratio depicts total discounted revenues divided by total discounted costs.

Value per cunit (100 cubic feet) is a simple relationship between total net revenues gained from a set of practices and the total net timber yield. The ratio allows interpretation of how each silvicultural practice functions to positively or negatively affect quantity (volume production) or quality (additions to value) of products produced.

Table X-3 Comparison of Yield Changes and Economic Returns for a 60-Year Rotation

Silvicultural System	Percent Change in Cubic Volume	Net Present Value (NPV)	Percent Change in NPV	Benefit/Cost Ratio	Value Per Cunit
BASE	*	\$301	*	1.38	\$3.78
PCT	+7%	\$530	+76%	1.68	\$6.21
PCT/FERT	+13%	\$611	+103%	1.72	\$6.78
PCT/CT	+15%	\$497	+65%	1.49	\$5.43
PCT/FERT/CT	+21%	\$677	+125%	1.62	\$7.04
PCT/PRUNE	+7%	\$713	+137%	1.71	\$8.35

Notes: % change in cubic volume is the increase in volume above that produced by base prescription (overstocked stand condition).

Net present value (NPV) is calculated by subtracting discounted costs from discounted benefits.

% change NPV is the percentage of NPV increase or decrease compared to the NPV of the base prescription.

Benefit cost ratio is calculated by dividing discounted benefits by discounted costs.

Value per cubic foot = Total NPV divided by total yield of all harvests in units (100 cubic feet).

Table X-3 Comparison of Yield Changes and Economic Returns for a 100-Year Rotation

Silvicultural System	Percent Change in Cubic Volume	Net Present Value (NPV)	Percent Change in NPV	Benefit/Cost Ratio	Value Per Cunit
BASE	*	\$470	*	3.04	\$3.47
PCT	+2%	\$526	+11%	2.74	\$3.80
PCT/FERT	+5%	\$532	+13%	2.57	\$3.75
PCT/CT	+17%	\$625	+32	1.86	\$3.84
PCT/FERT/CT	+20%	\$716	+52%	1.88	\$4.39
PCT/PRUNE	+2%	\$539	+15%	2.37	\$3.90

Notes: % change in cubic volume is the increase in volume above that produced by base prescription (overstocked stand condition).

Net present value (NPV) is calculated by subtracting discounted costs from discounted benefits.

% change NPV is the percentage of NPV increase or decrease compared to the NPV of the base prescription.

Benefit cost ratio is calculated by dividing discounted benefits by discounted costs.

Value per cubic foot = Total NPV divided by total yield of all harvests in units (100 cubic feet).

Table X-5 shows a comparison of two qualities influencing wood quality; average diameter at final harvest and average rings per inch.

Table X-5 Selected Tree Characteristics Which Affect Wood Quality

Silvicultural System	60 Years		100 Years	
	Average DBH	Rings per Inch	Average DBH	Rings per Inch
BASE	11 inches	11	16 inches	13
PCT	15 inches	8	20 inches	10
PCT/FERT	16 inches	8	21 inches	10
PCT/CT	17 inches	7	23 inches	9
PCT/FERT/CT	18 inches	7	24 inches	8
PCT/PRUNE	15 inches	8	20 inches	10

DBH = Diameter at breast height

All silvicultural systems showed an increase in timber yield above the base at both rotation ages analyzed. Gains were similar at both ages for silvicultural systems which included commercial thinning. The commercial thinning harvest trees which would otherwise die before final harvest and would not be recoverable (Smith 1962, Reukema and Bruce 1977). Those silvicultural systems that did not include commercial thinning did not recover this mortality and therefore showed a decline in percent yield increase at 100 years.

All silvicultural systems showed a positive economic return at both rotation ages simulated. All tested combinations of practices produced higher levels of economic return than the base level alone. Economic returns are greater for all systems for the 60 year rotations.

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Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers

River Name	Alternative	Rationale for Condition Change
Crabtree Creek (segment A)	No Action	No change; interim protection policy would maintain identified values.
	A	RTUs: 7 units; 54 acres (8 percent of corridor). RTRs: 0.36 miles new road construction. Other ¹ : 75-foot average width RMA (each side); VRM Class I management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for all identified outstandingly remarkable values.
	B	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : Existing Carolyn's Crown RNA; potential Crabtree Lake ONA and Schafer Creek RNA; 100-foot average width RMA (each side); biological diversity, restoration and rehabilitation blocks; VRM Class I management; potential Crabtree Lake SRMA and recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic, recreation, wildlife and ecological outstandingly remarkable values; no change for identified cultural outstandingly remarkable value.
	C	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : Existing Carolyn's Crown RNA; potential Crabtree Lake ONA and Schafer Creek RNA; 150-foot average width RMA (each side); biological diversity, 35 percent basal area retention blocks; VRM Class I management; potential Crabtree Lake SRMA and recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic, recreation, wildlife and ecological outstandingly remarkable values; no change for identified cultural outstandingly remarkable value.
	D	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : Existing Carolyn's Crown RNA; potential Crabtree Lake ONA and Schafer Creek RNA; 200-foot average width RMA (each side); habitat

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area;
DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
Crabtree Creek (segment A) (continued)		conservation area (spotted owl); VRM Class I management; potential Crab tree Lake SRMA, recreation site and trail; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic, recreation, wildlife and ecological outstandingly remarkable values; no change for identified cultural outstandingly remarkable value.
	E	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : Existing Carolyn's Crown RNA; potential Crabtree Lake ONA and Schafer Creek RNA; 200-foot average width RMA (each side); habitat protection areas; VRM Class I management; potential Crabtree Lake SRMA, recreation site and trail; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic, recreation, wildlife and ecological outstandingly remarkable values; no change for identified cultural outstandingly remarkable value.
	PRMP	RTUs: 0 units; 0 acres (0 percent of corridor- estimated). RTRs: 0.00 miles new road construction (estimated). Other ¹ : LSR1 - 682 acres (100 percent of corridor); RR - 396-foot average width (each side); existing Carolyn's Crown RNA; proposed Crabtree Lake ONA and Schafer Creek RNA; VRM Class I management; proposed Yellow-stone SRMA, recreation site and trail; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic, recreation, wildlife and ecological outstandingly remarkable values; no change for identified cultural outstandingly remarkable value.
Elkhorn Creek	No Action	No change; interim protection policy would maintain Identified values.
	A	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 75-foot average width RMA (each side); VRM Class II management; off-highway vehicle use limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values.

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area;
DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside
Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural
Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative
Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual
Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations
of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
	B	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.0 miles new road construction. Other ¹ : 140-foot average width RMA (each side); biological diversity, restoration and rehabilitation blocks; VRM Class II management; off-highway vehicle use limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values.
	C	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 210-foot average width RMA (each side); biological diversity, 35 percent basal area retention blocks; VRM Class II management; off-highway vehicle use limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values.
	D	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 280-foot average width RMA (each side); VRM Class II management; off-highway vehicle use limitations would apply to this allocation. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values.
	E	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 280-foot average width RMA (each side); habitat protection areas; VRM Class I management; potential recreation trail; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values.
	PRMP	RTUs: 0 units; 0 acres (0 percent of corridor - estimated). RTRs: 0.00 miles new road construction (estimated). Other ¹ : CA - 179 acres (20 percent of corridor); DDR - 633 acres (71 percent of corridor); RR - 396-foot average width (each side); VRM Class II management; proposed Little North Santiam River SRMA; proposed recreation trail; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values.

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
Lobster Creek (segment A)	No Action	No change; Interim protection policy would maintain identified values.
	A	RTUs: 6 units; 98 acres (7 percent of corridor). RTRs: 0.25 miles new road construction. Other ¹ : 75-foot average width RMA (each side); off-highway vehicle use limitations would apply to this allocation. Consequences: no change for identified fish outstandingly remarkable value.
	B	RTUs: 4 units; 76 acres (5 percent of corridor). RTRs: 0.12 miles new road construction. Other ¹ : 140-foot average width RMA (each side); biological diversity, restoration and rehabilitation blocks; off-highway vehicle use limitations would apply to these allocations. Consequences: no change for identified fish outstandingly remarkable value.
	C	RTUs: 4 units; 35 acres (2 percent of corridor). RTRs: 0.42 miles new road construction. Other ¹ : 210-foot average width RMA (each side); biological diversity, 35 percent basal area retention blocks; off-highway vehicle use limitations would apply to these allocations. Consequences: no change for identified fish outstandingly remarkable value.
	D	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 280-foot average width RMA (each side); habitat conservation area (spotted owl); off-highway vehicle use limitations would apply to these allocations. Consequences: no change for identified fish outstandingly remarkable value.
	E	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 280-foot average width RMA (each side); habitat protection areas; off-highway vehicle use limitations would apply to these allocations. Consequences: no change for identified fish outstandingly remarkable value.
	PRMP	RTUs: 4 units; 35 acres (2 percent of corridor - estimated). RTRs: 0.42 miles new road construction (estimated). Other ¹ : LSR1 - 1,287 acres (99 percent of corridor); RR - 396-foot average

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations
of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
		width (each side); off-highway vehicle use limitations would apply to these allocations. Consequences: no change for identified fish outstandingly remarkable value.
Molalla River (segment B)	No Action	No change; interim protection policy would maintain identified values.
	A	RTUs: 4 units; 34 acres (less than 1 percent of corridor). RTRs: 3.82 miles new road construction. Other ¹ : 75-foot average width RMA (each side); VRM Class II management; off-highway vehicle use limitations would apply to these allocations. Consequences: no change for all identified outstandingly remarkable values.
	B	RTUs: 4 units; 28 acres (less than 1 percent of corridor). RTRs: 0.20 miles new road construction. Other ¹ : 160-foot average width RMA (each side); VRM Class II management; potential recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for all identified outstandingly remarkable values.
	C	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 240-foot average width RMA (each side); VRM Class II management; potential recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and recreation outstandingly remarkable values; no change for identified geological outstandingly remarkable value.
	D	RTUs: 4 units; 28 acres (less than 1 percent of corridor). RTRs: 0.20 miles new road construction. Other ¹ : 320-foot average width RMA (each side); VRM Class II management; potential recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for all identified outstandingly remarkable values.
	E	RTUs: 4 units; 28 acres (less than 1 percent of corridor). RTRs: 0.20 miles new road construction. Other ¹ : 320-foot average width RMA (each side); habitat protection areas;

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area;
DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside
Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural
Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative
Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual
Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
Molalla River (segment B) (continued)		VRM Class II management; potential recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for all identified outstandingly remarkable values.
	PRMP	RTUs: 0 units; 0 acres (0 percent of corridor - estimated). RTRs: 0.00 miles new road construction (estimated). Other ¹ : GFMA - 3,419 acres (85 percent of corridor); LSR1 - 15 acres (less than 1 percent of corridor); RR - 396-foot average width (each side); VRM Class II management; proposed Molalla/Table Rock SRMA; proposed recreation site; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and recreation outstandingly remarkable values; no change for identified geological outstandingly remarkable value.
Nestucca River (segment A)	No Action	No change; interim protection policy would maintain identified values.
	A	RTUs: 54 units; 839 acres (17 percent of corridor). RTRs: 0.41 miles new road construction. Other ¹ : 75-foot average width RMA (each side); designated state scenic waterway; VRM Class I and II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified scenic and recreation outstandingly remarkable values; no change for identified fish outstandingly remarkable value.
	B	RTUs: 30 units; 361 acres; (7 percent of corridor). RTRs: 0.26 miles new road construction. Other ¹ : Existing Nestucca River and Elk Creek ACECs; 160-foot average width RMA (each side); designated state scenic waterway; VRM Class I and II management; existing Nestucca River SRMA; existing Alder Glen, Dovre, Elk Bend and Fan Creek Recreation Sites; existing Nestucca River National Back Country Byway; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified scenic and recreation outstandingly remarkable values; no change for identified fish outstandingly remarkable value.

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area;
DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside
Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural
Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative
Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual
Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
	C	<p>RTUs: 18 units; 196 acres (4 percent of corridor). RTRs: 0.80 miles new road construction. Other¹: Existing Nestucca River and Elk Creek ACECs; 240-foot average width RMA (each side); biological diversity, 35 percent basal area retention blocks; designated state scenic waterway; VRM Class I and II management; existing Nestucca River SRMA; existing Alder Glen, Dovre, Elk Bend and Fan Creek Recreation Sites; existing Nestucca River National Back Country Byway; potential recreation site and trail; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for all identified outstandingly remarkable values.</p>
	D	<p>RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other¹: Existing Nestucca River and Elk Creek ACECs; 320-foot average width RMA (each side); habitat conservation area (spotted owl); designated state scenic waterway; VRM Class I and II management; existing Nestucca River SRMA; existing Alder Glen, Dovre, Elk Bend and Fan Creek Recreation Sites; existing Nestucca River National Back Country Byway; potential recreation site and trail; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and recreation outstandingly remarkable values; no change for identified fish outstandingly remarkable value.</p>
	E	<p>RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other¹: Existing Nestucca River and Elk Creek ACECs; 320-foot average width RMA (each side); habitat protection areas; designated state scenic waterway; VRM Class I and II management; existing Nestucca River SRMA; existing Alder Glen, Dovre, Elk Bend and Fan Creek Recreation Sites; existing Nestucca River National Back Country Byway; potential recreation site and trail; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and recreation outstandingly remarkable values; no change for identified fish outstandingly remarkable value.</p>
	PRMP	<p>RTUs: 18 units; 196 acres (4 percent of corridor - estimated). RTRs: 0.80 miles new road construction (estimated).</p>

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
Nestucca River (segment A) (continued)		Other ¹ : LSR2 - 2,972 acres (72 percent of corridor); RR - 396-foot average width (each side); existing Nestucca River and Elk Creek ACECs; designated state scenic waterway; VRM Class I and II management; existing Nestucca River SRMA; existing Alder Glen, Dovre, Elk Bend and Fan Creek Recreation Sites; existing Nestucca River National Back Country Byway; two proposed recreation sites and trails; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and recreation outstandingly remarkable values; no change for identified fish outstandingly remarkable value.
North Fork Alsea River	No Action	No change; interim protection policy would maintain identified values.
	A	RTUs: 9 units; 116 acres (3 percent of corridor). RTRs: 0.50 miles new road construction. Other ¹ : 75-foot average width RMA (each side); VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified scenic and wildlife outstandingly remarkable values; no change for identified fish outstandingly remarkable value.
	B	RTUs: 10 units; 164 acres (5 percent of corridor). RTRs: 0.46 miles new road construction. Other ¹ : 160-foot average width RMA (each side); biological diversity, restoration and rehabilitation blocks; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified scenic and wildlife outstandingly remarkable values; no change for identified fish outstandingly remarkable value.
	C	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.24 miles new road construction. Other ¹ : 240-foot average width RMA (each side); biological diversity, 35 percent basal area retention blocks; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values; no change for identified fish outstandingly remarkable value.

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
	D	<p>RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other¹: 320-foot average width RMA (each side); habitat conservation area (spotted owl); VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values; no change for identified fish outstandingly remarkable value.</p>
	E	<p>RTUs: 5 units; 20 acres (less than 1 percent of corridor). RTRs: 0.05 miles new road construction. Other¹: 320-foot average width RMA (each side); habitat protection areas; potential recreation trail; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values; no change for identified fish outstandingly remarkable value.</p>
	PRMP	<p>RTUs: 0 units; 0 acres (0 percent of corridor - estimated). RTRs: 0.24 miles new road construction (estimated). Other¹: LSR1 - 1,455 acres (53 percent of corridor); RR - 396-foot average width (each side); VRM Class I and II management; proposed recreation trail; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified scenic and wildlife outstandingly remarkable values; no change for identified fish outstandingly remarkable value.</p>
South Fork Alsea River	No Action	No change; interim protection policy would maintain identified values.
	A	<p>RTUs: 21 units; 303 acres (6 percent of corridor). RTRs: 1.48 miles new road construction. Other¹: 75-foot average width RMA (each side); VRM Class II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified geological outstandingly remarkable value.</p>
	B	RTUs: 15 units; 209 acres (4 percent of corridor).

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
South Fork Alsea River (continued)		RTRs: 0.29 miles new road construction. Other ¹ : 160-foot average width RMA (each side); biological diversity, restoration and rehabilitation blocks; existing Alsea Falls Recreation Site; existing South Fork Alsea River National Back Country Byway; VRM Class I and II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for identified geological outstandingly remarkable value.
	C	RTUs: 12 units; 136 acres (3 percent of corridor). RTRs: 0.67 miles new road construction. Other ¹ : 240-foot average width RMA (each side); biological diversity, 35 percent basal area retention blocks; existing Alsea Falls Recreation Site and potential expansion area; existing South Fork Alsea River National Back Country Byway; VRM Class I and II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for identified geological outstandingly remarkable value.
	D	RTUs: 13 units; 154 acres (3 percent of corridor). RTRs: 0.42 miles new road construction. Other ¹ : 320-foot average width RMA (each side); existing Alsea Falls Recreation Site and potential expansion area; existing South Fork Alsea River National Back Country Byway; VRM Class I and II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for identified geological outstandingly remarkable value.
	E	RTUs: 2 units; 12 acres (less than 1 percent of corridor). RTRs: 0.07 miles new road construction. Other ¹ : 320-foot average width RMA (each side); habitat protection areas; existing Alsea Falls Recreation Site and potential expansion area and recreation trail; existing South Fork Alsea River National Back Country Byway; VRM Class I and II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations.

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
		Consequences: no change for identified geological outstandingly remarkable value.
	PRMP	RTUs: 12 units; 136 acres (3 percent of corridor - estimated). RTRs: 0.67 miles new road construction (estimated). Other: GFMA - 931 acres (20 percent of corridor); LSR1 - 1,268 acres (27 percent of corridor); RR - 396-foot average width (each side); existing Alsea Falls Recreation Site and proposed recreation trail; existing South Fork Alsea River National Back Country Byway; VRM Class II management; two elk emphasis areas; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: no change for identified geological outstandingly remarkable value.
Walker Creek	No Action	No change; interim protection policy would maintain identified values.
	A	RTUs: 3 units; 74 acres (9 percent of corridor). RTRs: 0.00 miles new road construction. Other: 75-foot average width RMA (each side); designated state scenic waterway; Walker Flat special status species habitat; VRM Class II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified ecological outstandingly remarkable value.
	B	RTUs: 4 units; 57 acres (7 percent of corridor). RTRs: 0.24 miles new road construction. Other: 100-foot average width RMA (each side); biological diversity, restoration and rehabilitation blocks; designated state scenic waterway; Walker Flat special status species habitat; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: adverse for identified ecological outstandingly remarkable value.
	C	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.15 miles new road construction. Other: 150-foot average width RMA (each side); designated state scenic waterway; potential Walker Flat ACEC; VRM Class I and II management;

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area; DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix AA

Rationale Supporting the Determinations of Condition Change - Wild and Scenic Rivers (continued)

River Name	Alternative	Rationale for Condition Change (continued)
Walker Creek (continued)		off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified ecological outstandingly remarkable value.
	D	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 200-foot average width RMA (each side); habitat conservation area (spotted owl); designated state scenic waterway; potential Walker Flat ACEC; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified ecological outstandingly remarkable value.
	E	RTUs: 0 units; 0 acres (0 percent of corridor). RTRs: 0.00 miles new road construction. Other ¹ : 200-foot average width RMA (each side); habitat protection areas; designated state scenic waterway; potential Walker Flat ACEC; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified ecological outstandingly remarkable value.
	PRMP	RTUs: 0 units; 0 acres (0 percent of corridor - estimated). RTRs: 0.15 miles new road construction (estimated). Other ¹ : AMA - 299 acres (41 percent of corridor); LSR2 - 98 acres (13 percent of corridor); RR - 396-foot average width (each side); designated state scenic waterway; potential Walker Flat ACEC; VRM Class I and II management; off-highway vehicle use closures and limitations would apply to these allocations. Consequences: beneficial for identified ecological outstandingly remarkable value.

¹ These protective allocations would either partially or wholly cover lands within the approximately one-half mile wide corridor. Overlapping coverage would occur in some circumstances, and no attempt has been made to separate these allocations into mutually exclusive acreage figures.

ACEC = Area of Critical Environmental Concern; AMA = Adaptive Management Area; CA = Connectivity Area;
DDR = District-Designated Reserve; GFMA = General Forest Management Area; LSR1 = Late-Successional Reserve outside
Adaptive Management Area; LSR2 = Late-Successional Reserve within Adaptive Management Area; ONA = Outstanding Natural
Area; RMA = Riparian Management Area; RNA = Research Natural Area; RR = Riparian Reserve; RTR = Representative
Timber Sale Road; RTU = Representative Timber Sale Unit; SRMA = Special Recreation Management Area; VRM = Visual
Resource Management.

Sources: Ten-year timber management scenario; Salem District recreation inventory records.

Appendix BB

Harvest Scheduling Model and Probable Sale Quantity Calculation

Selection of Model

Early in the planning effort, the BLM began exploring options for available timber harvest scheduling models. These computerized programs are designed to model timber land inventories and project harvest schedules into the future under different management regimes.

By early 1987, the BLM had tentatively selected the Trim-Plus model for use in the 1990s planning process. Public workshops were scheduled at several BLM western Oregon offices to discuss the choice of harvest model. The BLM selected the Trim-Plus model after considering the comments received and testing the model on data from the current plan.

Trim-Plus is a binary search model. It identifies the highest sustainable harvest level through a series of trial runs, each one raising or lowering the previous harvest level by a specified search increment. Trim-Plus is similar in this respect to the SIMMIX model, which was used by the BLM to generate harvest levels for the 1980s planning process.

Some of the features of Trim-Plus that led to its selection were:

- capability to make separate nondeclining harvest level calculations or simulations on multiple minimum harvest ages;
- ability to handle a variety of land use classes simultaneously;
- usable at the district level on desk top microcomputers;
- generates excellent reports and graphics displays;
- incorporates relatively simple, easy-to-use input and output files;
- provides many simulations at relatively low cost; and
- readily performs alternate harvest simulations, to test the impact on harvest levels of varying land use allocations or management prescriptions.

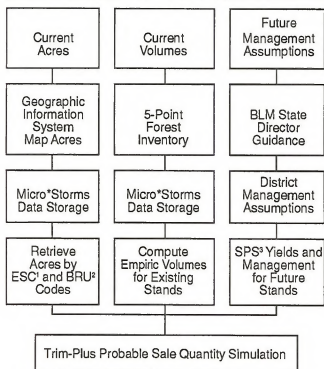
Probable Sale Quantity Calculation Process

The Trim-Plus model was used to determine probable sale quantity levels for lands allocated to intensive timber production or the General Forest Management Area for every alternative except alternative D. To perform a probable sale quantity simulation, Trim-Plus requires three basic types of information: (1) acres of forest land; (2) timber volumes on those acres; and (3) the yield assumptions to be implemented. The following flow chart outlines the principal components of the calculation process, and shows the sequence of operations involved in each simulation.

Current Acres

Acres for each Trim-Plus run are derived from digitized map overlays, part of the BLM's Geographic Information System. There is a separate digital map for each topic or theme pertinent to the plan. These maps can be overlaid or merged to allow analysis and generation of acres for any combination of themes under a variety of situations.

Probable Sale Quantity Flow Chart



¹ ESC = Existing Stand Condition

² BRU = Basic Resource Unit

³ SPS = Stand Projection System

The basic elements of the flow chart are described in the following sections.

Micro*Storms Data Base

Acres derived from the Geographic Information System, with related timber stand information, are stored in a large relational data base called Micro*Storms. Data is separated into four primary files:

- The SITE file which contains acreage, site description, timber type, past treatments and codes for Existing Stand Condition, which is a Micro*Storms identifier that groups stands by past treatment category and treatment recommendation
- The Timber Production Capability Classification file
- The Continuous Forest Inventory file, which contains data from the district's permanent timber inventory plots
- The MINI file, which is a reduced version of the SITE file

The MINI file was used to calculate the number of acres potentially available for timber harvest under each alternative. However, there are many overlaps among the various types of land designations which cause areas to be excluded from harvest. To avoid subtracting the same acres more than once, the acres excluded from harvest are calculated in a hierarchy for each inventory unit in the MINI file. The hierarchy of acres for the proposed resource management plan is summarized as follows:

Total District Acres	398,100
The following acres were subtracted in order:	
Wilderness	5,800
Roads	14,300
Nonforest	7,000
Fragile sites	36,400
Noncommercial forest	5,200
Administrative withdrawals	15,300
Riparian Reserves	175,700
Inoperable sites (slivers between Riparian Reserves)	20,400
Mature stands within Late-Successional Reserves	18,900
Forest lands on which harvest may occur	99,100

The number of acres displayed for each category include only the area that remains after the acreage of all categories higher on the list have been subtracted. For example, the 175,700 acres shown for Riparian Reserves do not include the acres of Riparian Reserves located within Table Rock Wilderness, nonforest areas, fragile sites, noncommercial forest, or administrative withdrawals.

The remaining 99,100 acres are potentially available for some type of timber harvest. However, approximately 37,200 acres of these remaining forest lands consist of young stands within Late-Successional Reserves. The only potential harvest on these areas would be density management thinnings designed to benefit the development of late-successional forest conditions.

Basic Resource Units

Within the Trim-Plus model, the available forest land base is segregated into large sustained yield unit groups. Sustained yield unit groups are broken into basic resource units by land use allocation, resource areas, site class group, kind of management, and timber type. The probable sale quantity and other output data from Trim-Plus is reported by basic resource unit and for groups of basic resource units, plus the entire sustained yield unit.

Current Volumes

The current timber volume on BLM forest lands is derived from analysis of data from more than 700 permanent (five-point) inventory plots distributed throughout the district. These plots are remeasured approximately every ten years. The last measurement was in 1987-1988. Each plot is a cluster of five sample points, and each point is the center of a fixed plot and a variable-radius (prism) plot. The plot data provides information pertaining to stand volume, stand age, tree species, tree sizes, defect, and growth rates. Information from the plots is stored in MicroStorms.

Empiric Yields

To represent the volume of existing stands in the Trim-Plus model, the actual inventory plot volumes for each age class have been used to develop empiric yield curves for each sustained yield unit. For each inventory group, stand volumes from the empiric yield curve were used for age classes that had fewer than three plots. The averages of the actual plot volumes were used for age classes that had three or more measured plots, and for all stands over 200 years old.

Future Management Assumptions

The yields of future stands depend on the kinds of management assumptions built into each alternative of the plan. These assumptions include the minimum harvest age, regeneration lag, future stocking levels, anticipated gains from planting of genetically improved seedlings, application of density control treatments such as precommercial and commercial thinning, use of forest fertilization, the stand ages when these treatments are applied, anticipated losses due to defect and breakage, and the portion of each stand to be retained for wildlife habitat needs or diversity of the future stand. Broad guidelines regarding the range of management practices appropriate to each of the common alternatives have been provided by the office of the BLM state director. These guidelines are referred to as State Director Guidance. Prescriptions for stand management under each alternative have been further refined at the district level. Details of this process are available at the Salem District office.

Stand Projection System

The yields for existing stands less than age 30 and for all future stands are estimated using the Stand Projection System. The Stand Projection System is a computer program designed to simulate the growth and development of forest stands. The program operates with a set of equations developed from data from a large number of forest research plots located throughout western Oregon and Washington. Yield outputs are provided in net cubic feet and in net board feet, Scribner.

The following criteria were used to guide the application of intensive silvicultural practices in the Stand Projection System model:

- Density control in young stands: Under all alternatives, stands received precommercial thinning if overstocked. In most cases, stands were thinned to 300 trees per acre if later commercial thinning was planned, and to 220 trees per acre where no further thinning was planned.
- Commercial thinning/density control: Under all alternatives, thinning was limited to the percentage of each sustained yield unit on which slope, topography, and road locations were suitable for partial cutting using either tractors or cable systems. Thinning prescriptions vary between alternatives and between different management zones under the proposed resource management plan. See chapter 2 for details.

- Forest fertilization: Intensively managed stands under alternatives no action, A, B, D, and E were fertilized three times at 15- to 20-year intervals. Stands within the General Forest Management Area under the proposed resource management plan were fertilized one, two, or three times. Each treatment consisted of 200 pounds of nitrogen per acre. The first application was made at time of precommercial thinning, and the last occurred at least ten years before final harvest. The second and third applications were made following commercial thinnings, in most cases. The Stand Projection System fertilization gains are based on recent studies by the Pacific Northwest Research Station, Forest Service.
- Genetic selection: Under alternatives no action, A, B, D, E, and the General Forest Management Area of the proposed resource management plan, genetically selected tree seedlings would be planted when they are available. Genetically selected stock would comprise no more than half of the seedlings planted under alternative C. Genetic gain was reflected in Stand Projection System by adjusting the site index so that stand heights at age 15 were increased by approximately the same percentage as the observed height gains in test plantations. Details of this procedure are also available at the district office.

Adjustments to Stand Projection System Yield Outputs

The Stand Projection System is built upon data from plots which have full stocking, no openings, and no significant damage. Therefore, Stand Projection System simulations provide estimations of maximum biological output. Actual forests are less uniform and subject to variable amounts of damage and loss. Because of this, the simulation must be adjusted for field conditions. Adjustments have been made in the following ways:

- Stand tables: Tree lists from existing stands have been used as a starting point for many of the Stand Projection System simulations.
- Defect and breakage: A variable percentage adjustment, depending on stand age, has been applied to stand projection system outputs to reflect volume loss at harvest due to defect and breakage.
- Clumpiness factor: A discount factor has been estimated for nonstocked openings and understocked areas in stands. For each sustained yield unit, this discount was determined by analyzing stocking on the 10 and 20-year-old plots of the five-point inventory. These results were used to derive the clumpiness factor in the Stand Projection System model, which refers to the percentage of each area which is actually stocked. By sustained yield unit, the clumpiness factor ranged from 83 to 88 percent.
- Soil compaction: Salem's Timber Production Capability Classification identifies tracts which have been subjected to detrimental soil compaction on more than 12 percent of the area. The compaction resulted from either tractor yarding or tractor clearing for site preparation. Projected yields on those acres have been reduced by 6 percent.
- Root rot: Survey data indicate that an average of 14 percent of the Salem District's commercial conifer acres are infected with root rots, particularly laminated root rot, *Phellinus weirii*. Areas with identified root rot infection would be planted with species resistant or immune to the disease following harvest. This would reduce the infected area in those locations. However, further spread of root disease would be expected in harvested areas in which existing root rot infection is not identified. Yields have been reduced by 50 percent on infected acres to account for root rot losses.
- Green Tree Retention: Under alternative C and the proposed resource management plan, some merchantable trees would be left standing within harvest units to provide other resource values. Under alternative C, the portion of the stand available for harvest was identified within the Trim-Plus model. Under the proposed resource management plan, yields from the Stand Projection System model were discounted directly to reflect retention of merchantable live trees. Details of this process are available at the district office.

Probable Sale Quantity determination for Alternative D

Alternative D was designed to incorporate the basic features of the Interagency Scientific Report, or Thomas Plan, regarding habitat needs for the northern spotted owl. Under the recommendations of this report, particular blocks of land called habitat conservation areas would be excluded from any planned harvest. Timber harvest on all other areas would have spatial constraints, following what is known as the 50-11-40 rule. To comply with the rule, forest stands on BLM-administered lands within each quarter township (160 acres) would need to meet or exceed the 50-11-40 standard at any point in time. This means that at least 50 percent of those forest stands would need to have an average diameter of at least 11 inches at breast height and have at least 40 percent crown closure.

The Trim-Plus model does not have the ability to operate with the 50-11-40 constraint. Consequently, the alternative D probable sale quantity was determined with an alternate harvest scheduling model developed by the BLM. This 50-11-40 model was developed within the Micro*Storms data base, which contains the basic stand information needed to determine: (1) the number of acres located outside habitat conservation areas; (2) the proportion of those acres with timber stands over 40 years of age (assumed to meet the 11-inches diameter requirement); and (3) the proportion of those acres in turn having stands with at least 40 percent crown closure. Only forest acres in excess of 50 percent of the acres determined above are considered available for harvest. A minimum 80-year rotation length is imposed by making no more than 1/8 (west side of district) and 1/11 (east side of district) of the total acres within a township quarter available for harvest in any decade.

Probable Sale Quantity Determination for the Proposed Resource Management Plan

Under the proposed resource management plan, the probable sale quantity is the sum of the first-decade harvest levels for the three land-use designations subject to programmed timber harvest; the General Forest Management Area, the Connectivity/Diversity Blocks, and the Adaptive Management Area.

For the General Forest Management Area allocation, the Trim-Plus model was used to calculate the highest sustainable harvest level. Intensive silvicultural practices such as use of genetically selected seed, precommercial thinning, and fertilization were used in estimating future yields for managed timber stands.

For the Connectivity/Diversity Blocks, regeneration and thinning harvests were projected using an area regulation method. This means that if the planned rotation age for Connectivity Blocks is 150, then 1/15 of the available acres would be scheduled for regeneration harvest each decade. The acres and volume available for regeneration harvest and thinning in each decade were then projected in computer spreadsheets. When using area regulation, the number of acres of regeneration harvest each decade is the same, but the volume removed varies, depending on the size of the trees and the density of the stands being harvested. The acres and volume of commercial thinning are also variable, depending on the number of acres of stands suitable for thinning in each decade.

For the Adaptive Management Area, the acres available for thinnings in each decade were also projected in computer spreadsheets, in the same manner as for the Connectivity/Diversity Blocks. The acres and volume of thinnings vary from decade to decade, depending on the number of acres of stands suitable for thinning in each decade.

The harvest volume from all three allocations was added together to determine the probable sale quantity. Over the first 10 decades of the plan, total harvest would fluctuate from about 3 percent above to 5 percent below the first-decade level.

Allowable Cut Effect

Existing forests on the Salem District are composed of mature stands which became established following large fires in the last century, old-growth stands, and young stands on lands harvested during the last 30 to 40 years. The older stands have passed the stage of most rapid growth. Many of the younger stands are not old enough to begin producing a significant volume of merchantable timber. Because of this, the average annual growth of the forest, in terms of merchantable cubic feet, is less than its potential. The forest could be regarded as being in transition from an unmanaged to a managed state.

In the classical sense, a regulated forest is achieved when it contains approximately equal acreage in each age class bracket. The average annual growth and harvest are then in balance, and the forest can produce its maximum sustainable annual yield of timber.

For alternatives A through E and no action, the current harvest level is based on the existing timber inventory and predicted levels of future growth. This approach assumes that certain forest management practices such as genetic improvement, fertilization, and thinning would produce predictable increases in future yields. As excess harvest age timber in the present forest is gradually depleted, levels of growth and harvest eventually would come into balance. This process of taking credit now for expected future growth increases has been termed the allowable cut effect. For the proposed resource management plan, the allowable cut effect applies only to the General Forest Management Area allocation.

Appendix CC

Timber Supply Analysis For BLM Planning

Background

In 1992, the BLM released draft environmental impact statements for the Coos Bay, Eugene, Medford, Roseburg, Salem, and Klamath Falls Resource Area-Lakeview districts draft resource management plans. These drafts included a comprehensive analysis of timber supply in western Oregon. The analysis covered a period of initial plan implementation (1991 to 2000) and the period thereafter (2001 to 2010). The baseline period that provides a historical benchmark for comparison was 1984 to 1988.

Details of the original analysis are described in the draft environmental impact statements (Anonymous 1992). Regional stumpage price results were used to calculate price changes for the assessment of personal income, employment, and population effects. Harvest and log consumption results are presented in chapter 4.

Key Concepts

Implemented on all Districts, each set of similar resource management plan alternatives represented a different timber supply policy, or alternative theme, for BLM-administered lands in western Oregon. The question being addressed by this analysis is how do changes in BLM timber supply policy affect how much timber is harvested and consumed in various parts of western Oregon? Western Oregon was divided into subregions that differed in ownership distribution, private timber availability, and silvicultural management, while at the same time served as logical reporting areas for western Oregon BLM districts. Changes in one subregion could affect another through the transportation of logs from harvest origin to processing destination. The analysis recognized that the BLM is just one timber supplier within western Oregon and that the impact of harvest changes is felt where the timber is actually consumed. The amount of timber offered for sale by the BLM affects stumpage price. In turn, stumpage price influences private timber harvest. The lower the BLM sale quantity, the higher stumpage prices, and the higher the level of private timber harvest.

Timber demand is determined by factors outside the control of the BLM such as housing starts and other national economic variables like gross domestic product and the interest rate. Year to year fluctuations in timber demand were averaged over a ten-year period. Timber supply is determined by ownership, location, and stand condition. Ownership determines the policy specifying the conditions under which the timber may be harvested. Location accounts for variations in species composition and the amount of timber available for harvest. Stand condition measures the amount of harvestable volume available on a per acre basis, as well as the growth rate and stage of development of this volume. Private timber harvest is directly proportional to stumpage prices. This analysis accounted for changes in private timber supply by assessing inventory conditions at the beginning of each analysis period. For public agencies such as the Forest Service and the BLM, timber supply is fixed at the planned allowable sale quantity; regardless of the stumpage price.

Market equilibrium defines a balance between timber supply and demand: the amount of timber harvested equals the amount of timber consumed at the market clearing price. Implementing a new BLM timber policy will disrupt this balance and leads to adjustments in the stumpage price such that a new timber supply and demand balance is created. In this analysis, market equilibrium is explicitly recognized for the Pacific Northwest - westside region, and this implies a local equilibrium within each western Oregon subregion.

Updated Procedures

As was the case in 1992, the analysis consisted of the following steps for the 1991-2000 period¹: (1) regional market equilibrium; (2) disaggregation of the private harvest; (3) timber harvest by ownership; (4) reapportioning harvest into log consumption; and for the 2001-2010 period; and (5) updating the private inventory, projecting the private harvest, and re-estimating log consumption.

Timber Assessment Market Model (TAMM) (Adams and Haynes 1980, Haynes 1990) run² results for the 1992 analysis indicated a linear relationship between private timber supply and BLM alternative sale quantity (Anonymous 1992). This analysis relied on interpolating the results from two updated TAMM runs representing federal timber supply levels of 187 million cubic feet per year and 322 million cubic feet per year respectively. The first run³ corresponds to the Resources Planning Act base run used to evaluate the Forest Plan for "Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl". The second run⁴ represented an arbitrarily set higher level of federal timber supply. The interpolations were based on changes in the BLM share of the Pacific Northwest - westside federal timber supply for the alternative theme being analyzed. national forest harvest levels were held at their level in the 1994 Resources Planning Act base run (93 million cubic feet per year). The other public harvest for the Pacific Northwest - westside supply region was left unchanged at 147 million cubic feet per year.

When compared to the base run used in the 1992 analysis⁵, the April 1994 RPA TAMM base run included several updates relevant to the Pacific Northwest - westside supply region⁶. The most relevant was an overall reduction in private timber supply due to inventory updates. This had the effect of lowering TAMM's estimate of private growing stock removals given similar policy and economic conditions used in the 1992 analysis. Other TAMM updates included revisions in historical input data for revised estimates of the proportion of sawtimber volume from growing stock removals. Observed harvest values for the years 1991 and 1992 replaced estimates used in the 1992 analysis.

The procedures and assumptions used to complete steps (2) - (5) above remained the same as those used in the 1992 analysis (see Anonymous 1992).

Results and Discussion

Results are presented in tables 1 through 3. When compared with the 1992 analysis, the results indicate an overall lower level of private timber supply under higher stumpage price levels. The higher stumpage prices reflect the markedly lower level of timber supply from national forests. In the 1992 analysis, national forests were held at a supply level of 240 million cubic feet per year (consistent with their proposed plan modifications under the Interagency Scientific Committee conservation strategy for the northern spotted-owl). However, under implementation of the President's Forest Plan, the national forest timber supply is reduced to 93 million cubic feet per year. In spite of this price increase, the level of private harvest is lower than estimated in the 1992 analysis. This reflects the private inventory updates in TAMM.

When compared to the 1984-1988 baseline, the private harvest under each BLM alternative theme increases over 1991-2000. This can be attributed to increases from the nonindustrial private ownership. Comparison of the 2001-2010 projections with the 1991-2000 harvest disaggregation shows a dramatic increase in the total private harvest, over 130 million cubic feet per year. One important qualification for this harvest gain is that pre-1990 forest practice rules and related environmental constraints on the private timberlands remain unchanged through 2010. Therefore, these increases may not be entirely attainable given recent changes in Oregon forest practice regulations for stream protection and proposed conservation restrictions on private lands for the marbled murrelet, northern spotted owl, and possibly coho salmon.

Western Oregon was a net importer of logs over the 1984-1988 period as total consumption exceeds harvest. This was not allowed to vary in this analysis. Differences in log consumption across BLM resource management plan alternatives were less noticeable given the large share of timber harvest still forthcoming from all other ownerships. For all BLM resource management plan themes, log consumption in western Oregon is projected to decrease when compared to the 1984-1988 baseline period. Most of this decrease is from reduced national forest allowable timber sale quantities under the President's Forest Plan and TAMM reductions in private timber availability. Private harvest increases in the 2001-2010 period translate into higher levels of consumption for this period.

Literature Cited

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Haynes, R.W. Coordinator. 1990. An analysis of the timber situation in the United States: 1989-2040. General Technical Report RM-199. Ft. Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 286 p.

¹ See Anonymous (1992) for a detailed description of each step.

² TAMM90 log runs 582, 583, 584, and 587.

³ Timber Assessment Market Model - 1993 Montana Version, LR-207 (RPA-Base, April 14, 1994).

⁴ Timber Assessment Market Model - 1993 Montana Version, Log Run CT2, June 24, 1994.

⁵ TAMM90, Log-Run 581, April 9, 1992.

⁶ R. Haynes, and J. Mills. Social and Economic Values Research Program, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland Forestry Sciences Laboratory, PO Box 3890, Portland, Oregon 97208.

Table CC-1 Regional Market Equilibrium Results by BLM Resource Management Plan Theme

Bureau of Land Management		Timber Supply Analysis Results	
Resource Management Plan Theme	Allowable Sale Quantity (mmcf/year)	1991-2000 Regional Stumpage Price (1982 \$/mbf)	1993-2000 Western Oregon Private Growing Stock Removals (mmcf/year)
1984-1988 Historical	199	\$112.42	602
No Action Alternative	187	\$255.63	618
Alternative A	250	\$250.41	610
Alternative B	224	\$252.53	613
Alternative C	67	\$266.05	635
Alternative D	74	\$264.94	633
Alternative E	56	\$267.07	637
PRMP	35	\$268.86	640
TAMM LR-207	94	\$263.64	631
TAMM LR-CT2	136	\$251.85	612

mbf = thousand board feet, long log scale.

mmcf/year = million cubic feet per year

Table CC-2 Results for the 1993-2000 Private Harvest Disaggregation and 2001-2010 Harvest Projections

Resource Management Plan Theme	Private Harvest, Western Oregon (million cubic feet per year)					
	1993-2000			2001-2010		
	IND	NIPF	Total	IND	NIPF	Total
PRMP (BLM ASQ = 35)	465	175	640	558	213	771
No Action (BLM ASQ = 187)	449	169	618	549	208	757
Alternative A (BLM ASQ = 250)	443	167	610	545	206	751
Alternative B (BLM ASQ = 224)	446	168	614	547	207	754
Alternative C (BLM ASQ = 67)	461	174	645	556	212	768
Alternative D (BLM ASQ = 74)	460	174	634	555	211	766
Alternative E (BLM ASQ = 56)	462	175	637	556	212	768
Timber Availability ¹ (BLM ASQ = 190)	544	125	669	557	125	682
1984-1988 Baseline	IND	NIPF	Total			
(BLM Harvest = 202)	525	77	602			

¹ Sessions, John, coordinator. 1990. Timber for Oregon's tomorrow. The 1989 update. Corvallis, Oregon. Oregon State University, College of Forestry, Forest Research Lab. 183 p. Table 3: Log consumption results by BLM resource management plan theme.

PRMP = Proposed Resource Management Plan

IND = Private industrial ownership.

NIPF = Private non-industrial ownership.

BLM ASQ = BLM resource management plans cumulative allowable sale quantity for western Oregon (million cubic feet per year). Includes the Klamath Resource Area of the Lakeview District.

BLM Harvest = Bureau of Land Management actual harvest (million cubic feet per year).

Table CC-3 Log Consumption by Western Oregon Processing Facilities
(million cubic feet per year)

Resource Management Plan Theme	1993-2000				2001-2010			
	HARV	END CNSMP	EXOG CNSMP	Total CNSMP	HARV	END CNSMP	EXOG CNSMP	TOTAL CNSMP
PRMP	797	761	97	858	928	882	97	979
No Action Alternative	929	890	98	987	1,067	1,018	98	1,115
Alternative A	982	942	97	1,039	1,123	1,072	97	1,170
Alternative B	961	922	97	1,019	1,101	1,051	97	1,148
Alternative C	825	789	97	886	958	911	97	1,008
Alternative D	831	794	97	892	964	917	97	1,014
Alternative E	816	779	97	876	947	900	97	997
	HARV	END CNSMP	EXOG CNSMP	Total CNSMP				
1984-1988 Baseline	1,248	1,196	98	1,294				
<p>PRMP = Proposed Resource Management Plan</p> <p>HARV = Total harvest from all ownerships within western Oregon (million cubic feet per year).</p> <p>END CNSMP = Consumption of logs originating from ownerships within western Oregon (million cubic feet per year). The difference between HARV and END CNSMP represents the volume of timber originating in western Oregon, but processed by out-of-state or eastern Oregon mills.</p> <p>EXOG CNSMP = Consumption of logs originating from ownerships from eastern Oregon and out-of-state (million cubic feet per year). Differences reflect the effect of implementing different BLM resource management plan alternatives on Klamath Resource Area of the Lakoview District in eastern Oregon.</p> <p>Total CNSMP = Total log consumption (all origins) by western Oregon processing facilities (million cubic feet per year).</p>								

Appendix DD

Reasonably Foreseeable Scenario for Mineral Exploration and Development Potential in the Salem District Planning Area

Oil and Gas

Economic conditions dramatically affect drilling activity, and at the present time oil and gas markets are depressed. An upturn in the petroleum market, however, could create a significant increase in the number of wells drilled within the planning area as a great portion of the area has moderate to high oil and gas potential. The following sections briefly describe the planning area's historical, present, and reasonably foreseeable oil and gas activity.

Prospectively Valuable for Oil and Gas

Most of the land within the Coast Range and Willamette Valley is classified as prospectively valuable. Prospectively valuable criteria include a minimum thickness of 1,000 feet of sedimentary rocks at depths no greater than 35,000 feet below the surface, a favorable structural setting, and direct or indirect evidence of oil and gas potential, such as oil seeps, oil and/or gas shows in test wells, past or present production, seismic information, similarity with known producing rocks, or acceptable levels of thermal maturation.

Oil and Gas Potential

Oil and gas potential rating criteria are described in chapter 3. In general, areas of production, areas being explored or leased, and some surrounding prospectively valuable lands are considered to have high potential. Areas marginal to these sites which meet criteria for classification as prospectively valuable for oil and gas are rated as moderate potential. Areas not designated as prospectively valuable are rated as having low potential.

Historical and Current Background

The planning area has a long history of oil and gas exploration. The only commercial production to date in the planning area has been from reservoirs in Eocene sandstones at the Mist gas field. Exploratory drilling in the Mist area of northwestern Oregon began in 1945 and eventually led to the discovery of the Mist gas field. The Mist field is located on a faulted, northwest-trending anticline about 45 miles northwest of Portland. The field was discovered in 1979 (after several dry holes with shows of gas but no oil) by partners Reichhold Energy Corporation, Diamond Shamrock Corporation, and Northwest Natural Gas Company. While Reichhold and Diamond Shamrock were pursuing a commercial gas discovery, Northwest Natural Gas was more interested in finding a gas storage site for pipeline gas.

After eleven years of development drilling, the success ratio is about one in four, with over 40 pools discovered by the end of 1991. Production is generally from depths of 1,500 to 2,500 feet, with a total field production of 41 billion cubic feet. The gas sand is about 600 feet thick, with 20 feet to 150 feet of gas.

Reservoir rock are the permeable sandstones of the upper Eocene Cowlitz Formation, the Clark and Wilson Sandstone. A shallow sand above this reservoir also has produced gas in several wells, and a deeper sand also has gas potential. The trapping conditions at Mist are complex. Most of the gas pools are in fault traps on a large anticlinal structure. However, at least one gas pool occurs in a shale-encased sandstone, a pure stratigraphic trap. Tuffaceous deep water shales of the upper Cowlitz and Keasey Formations overlie the gas-producing reservoir sandstones and serve as impermeable sealing beds. The source of the gas at Mist is still under debate. The Mist gas is very dry and isotopically light; its composition suggests that it was thermally generated. While no oil has been reported from the Mist field, minor shows of oil and gas were reported from a well drilled southeast and down-dip from Mist (Exxon Corp. GPE Federal Com 1).

Two depleted gas pools at Mist have been converted to gas storage. Northwest Natural Gas Company has drilled nine injection wells and thirteen monitor wells in two pools and uses the facility to store up to 10 billion cubic feet for peak demand periods. The field has therefore evolved to fulfill intentions of both its early explorers, production and gas storage.

The U.S. Geological Survey includes Tertiary strata in all of western Oregon and Washington in their gas play. The play is based on the assumption that the Mist gas field is an analog for all undiscovered hydrocarbon accumulations larger than 1 million barrels of oil or 6 billion cubic feet of gas.

To provide transport of the gas to market, pipelines from the Mist gas field tie into the main line at Clatskanie, and the new south Mist feeder pipeline to the Portland metropolitan area.

A 1981 discovery in the central Willamette basin produced a total of 10 million cubic feet of gas from Eocene rocks. This discovery, the Lebanon gas field, represents a significant show of gas, and was a positive sign for future potential of the basin. Discovery has not been followed by much further drilling. About 40 wells have been drilled in the basin, but well density is still very low.

Present Activity

Presently, exploration is proceeding in the Mist Gas Field. In spite of low gas prices in 1991, five exploratory wells were drilled and one redrill resulting in the discovery of three new gas pools. In addition, two more injection-withdrawal service wells were drilled at the Mist Natural Gas Storage Project.

Reasonably Foreseeable Future Scenario

Based on the preceding analysis of past and current oil and gas activities and trends, the following is a description of the reasonably foreseeable oil and gas exploration and development activity anticipated in the planning area over the next 10 to 15 years.

Geophysical Exploration

Geophysical work reached a peak in the Mist gas field in 1985. From 1980 to 1990, ten geophysical notices were processed by the BLM for operations on federal lands. Most of the notices were for areas east of the Mist gas field near the town of Scappoose.

During the next 15 years, an average of about one geophysical project per year is estimated within the planning area, and geophysical work will continue as drilling prospects are defined. Most of these would probably involve seismic methods. Projects would involve several lines typically 3 to 30 miles in length, with most activity taking place on existing rights-of-way. It is estimated that about 95 percent of all activity will take place on private and county lands. There are only two small parcels of federal land within the Mist gas field. Most of the federal land is to the east.

General Oil and Gas Drilling Activity

Future exploration would probably occur to the east, northeast, south, and west of the Mist gas field, well depths probably continuing in the 1,500 to 3,000 foot range, although the basin may become significantly deeper to the east. Even if the economics become more favorable, the exploration rate would probably continue at about the same as at present with step out wells from the Mist gas field.

Based on past activity and professional judgment, it is reasonable to expect the activity from the 1980s would continue into the 1990s. More than 200 wells had been drilled in Oregon and five of them at Mist before the Mist gas field was discovered. Since the gas field was discovered in 1979, approximately 120 wells have been drilled during the first ten years of commercial production. One well, the Exxon Corp. GPE Federal Com. 1 was drilled on federal land in 1985 east of the Mist gas field.

Unless gas price or demand increases substantially, about five to seven wells per year are expected during the next fifteen years.

Most wells at Mist require a flat well pad of 100 feet by 200 feet. Wells in the Mist field are generally located near existing public roads or logging roads, but sometimes additional gravel or new roads must be added to reach a site. Each of these sites would create an estimated one-half acre of surface disturbance for drill pads, and one-half acre each for access. Total disturbance, assuming seven wells a year for 15 years would be up to 105 acres. Most exploratory and production drilling occurs on private or county lands (95 percent), so federal surface disturbance might only involve a maximum of five acres. Sites are reclaimed when drilling and production operations are concluded.

If another gas field is discovered, possibly 5 to 40 wells might be needed, involving about 10 to 80 acres disturbance. This would include about 5 to 40 acres for drill pads and access roads, and 5 to 10 acres for pipeline construction within the field. The amount of disturbance to connect the field with an existing pipeline would vary depending on its location within the planning area. Given the land ownership pattern, a field would typically involve no more than about 50 percent federal ownership, resulting in an estimated surface disturbance of about 5 to 40 acres on federal lands.

Future exploration does not necessarily mean that producing wells will be discovered. Only a small percentage of exploratory wells in the planning area have been completed as producers.

Recent economic conditions within the oil industry resulted in a sharp decline in the number of active exploratory wells and the number of developmental wells. A turn around in the oil industry or an increase in the price of oil purchased from abroad would spur an increase in oil and gas activity in the planning area. Continued low oil and gas prices and depressed economic conditions would result in a continued low level of domestic exploration and development.

Gas Production

The state of Oregon sets spacing unit sizes for the production of gas. Although the federal government is not bound by these spacing unit sizes, they are generally recognized. The spacing units are intended to prevent waste and conserve the resource. Statewide spacing units are surveyed sections, or quarter sections, or quarter-quarter sections. For gas production shallower than 7,000 feet, a maximum of one producing well may exist on a 160-acre quarter section. For gas production from deeper than 7,000 feet, one producer may exist on each 640 acres or a section. The well location for purposes of spacing is the location of the well bore at the top of the producing horizon and must be at least 500 feet from the spacing unit boundary. Special field rules in the Mist field, however, allow a setback distance of 250 feet from the spacing unit boundary to allow a more effective search for the small pools that characterize the field. The unit sizes are the same as for statewide spacing and apply to each pool. More than one well could be drilled in a quarter section, for example, if each produced from a different pool.

Oil Production

Although no oil field discoveries are expected within the planning area, wells drilled during gas exploration will continue to be evaluated for possible oil production. This is because maturation studies of source rock demonstrate the area to be a gas province, as is the case of the Mist gas field.

Appendix EE

Estimated Harvest Acres in the Short Term within 1/2-mile of 1 to 20-Acre Zoned Areas

T	R.	BLM Acres in RIA	Alternatives					PRMP
			A	B	C	D	E	
2 N.	2 W.	320	0	0	0	62	0	
2 N.	3 W.	100	0	0	15	0	0	
3 N.	2 W.	514	57	57	0	73	54	
4 N.	2 W.	162	0	0	0	7	0	
4 N.	3 W.	191	0	0	14	15	0	
1 S.	5 E.	249	57	51	43	35	20	
1 S.	5 W.	232	62	0	0	57	0	
1 S.	8 W.	2,157	420	407	0	166	105	
1 S.	9 W.	602	207	251	117	142	152	
2 S.	4 E.	490	0	0	0	16	0	
2 S.	5 E.	199	0	0	0	0	44	
2 S.	6 E.	1,531	401	89	0	221	38	
2 S.	5 W.	613	0	44	236	121	100	
3 S.	3 E.	1,153	16	22	3	8	6	
3 S.	5 W.	969	71	133	15	0	39	
3 S.	8 W.	204	45	44	64	0	23	
3 S.	9 W.	206	29	29	85	0	0	
4 S.	3 E.	1,151	31	59	0	120	33	
4 S.	4 E.	320	0	0	0	6	0	
4 S.	5 W.	280	43	4	0	0	3	
4 S.	6 W.	592	4	15	16	15	14	
5 S.	2 E.	258	0	0	0	29	0	
5 S.	3 E.	53	0	0	0	6	0	
5 S.	7 W.	1,236	5	38	10	24	3	
6 S.	1 E.	179	0	0	0	7	0	
6 S.	2 E.	1,950	111	87	58	111	77	
8 S.	3 E.	13	0	0	0	5	0	
8 S.	4 E.	211	0	0	0	2	37	
9 S.	1 E.	53	26	26	28	0	0	
9 S.	2 E.	1,116	51	52	116	48	87	
9 S.	3 E.	1,278	0	0	8	10	63	
9 S.	10 W.	16	11	11	0	10	7	
9 S.	11 W.	39	9	9	0	0	0	
10 S.	1 E.	2,070	0	0	142	35	79	
10 S.	2 E.	2,248	25	0	0	43	71	
10 S.	10 W.	21	20	21	0	0	16	
11 S.	1 E.	1,094	0	0	0	27	14	
13 S.	7 W.	1,939	46	36	55	31	0	
13 S.	8 W.	81	0	34	32	0	0	
13 S.	11 W.	71	0	0	0	15	0	
14 S.	7 W.	1,284	192	176	21	120	0	
14 S.	8 W.	3,778	1,180	864	271	169	510	
14 S.	9 W.	435	100	123	13	0	67	
15 S.	8 W.	1,412	54	245	80	0	277	
15 S.	9 W.	130	30	30	0	0	29	
Total			3,304	2,960	1,442	1,756	1,968	480 ¹

¹ Proposed resource management plan harvest level about one-third of alternative C.

RIA = Rural Interface area

T. = township

R. = range

Sources: Western Oregon Digital Data Base and ten-year timber harvest scenarios.

Appendix FF

Consistency of the Proposed Resource Management Plan with State of Oregon Wildlife Plans

State Plan/Statute: Oregon Statutory Wildlife Policy, Revised Statute 496.012

Objectives

Maintain all species of wildlife at optimum levels and prevent the serious depletions of any indigenous species.

Develop and manage the lands and waters of the state in a manner that will enhance the production and public enjoyment of wildlife.

Develop and maintain public access to the lands and waters of the state and the wildlife resources thereon.

Regulate wildlife populations and public enjoyment of wildlife in a manner that is compatible with primary uses of the lands and waters of the state and provide optimum public recreational benefits.

Consistency of Proposed Resource Management Plan

May maintain some populations at less than optimum (see later discussion of big game population management objectives and chapter 4, Effects on Wildlife section).

Public access would be limited by access management.

State Plan/Statute: Oregon Threatened and Endangered Species Act

Objective

Protect and conserve wildlife species that are determined to be threatened or endangered.

Consistency of Proposed Resource Management Plan

All state-listed species found within Salem District are also federally listed under the Endangered Species Act. As such, these species will be protected under the requirements and provisions of the act.

State Plan/Statute: Oregon's Sensitive Species Rule

Objective

Help prevent species from qualifying for listing as threatened or endangered.

Consistency of Proposed Resource Management Plan

Species on Oregon's sensitive species list would be protected well. Also see later discussions of wild fish policy and fish plans.

State Plan/Statute: Nongame Wildlife Plan

Objective

Maintain populations of naturally occurring Oregon nongame wildlife at self sustaining levels within natural geographic ranges in a manner that provides for optimum recreational, scientific and cultural benefits and, where possible, is consistent with primary uses of lands and waters of the state.

Consistency of Proposed Resource Management Plan

See preceding discussions.

State Plan/Statute: Big Game Population Management Objectives

Objective

Develop, restore and/or maintain big game (along with associated recreation, aesthetic and commercial opportunities and benefits) at the level identified in 1980 as the planning target level by game management unit. This is accomplished through hunting season regulation and management practices on public lands that tend to stabilize the cover-forage relationship in space and time, provide for a wildlife emphasis in management of sensitive wintering areas, and offer habitat improvement opportunities.

Consistency of Proposed Resource Management Plan

Forage on BLM-administered lands would decline. Private lands, however, are expected to provide adequate forage. Access management would improve habitat for elk.

State Plan/Statute: Wild Fish Policy

Objective

Protect and enhance wild stocks.

Consistency of Proposed Resource Management Plan

Would not change habitat conditions enough in the short-term to alter existing stocks. In the long-term, would protect streams sufficiently to protect wild stocks and provide sufficient stream habitat protection to contribute to their enhancement.

State Plan/Statute: Coho, Steelhead and Trout Plans

Objective

Maintain and enhance production.

Consistency of Proposed Resource Management Plan

Similar to wild stocks. See preceding.

State Plan/Statute: Basin Fish Management Plans

Objective

Establish compatible objectives for management of all fish stocks in each basin.

Consistency of Proposed Resource Management Plan

Similar to wild stocks. See preceding.

State Plan/Statute: Oregon Forest Practices Act Rules

Objective

Establish minimum standards which encourage and enhance the growing and harvesting of trees while considering and protecting other environmental resources such as air, water, soil and wildlife.

Consistency of Proposed Resource Management Plan

See Forestry Program for Oregon Objective: Forest Practices in appendix GG.

Appendix GG

Consistency of the Proposed Resource Management Plan with the Forestry Program for Oregon

Forestry Program for Oregon Objective: Forest Land Use

Preserve the forest land base of Oregon: Stabilize the present commercial forest land base. Manage habitat based on sound research data and the recognition that forests are dynamic and most forest uses are compatible over time.

Consistency of the Proposed Resource Management Plan

Preserves most of the forest land administered by BLM, while allowing for some conversion of forest to accommodate expansion of transportation, power and communication facilities. Also allows for exchange and/or sale of some forest lands, which could lead to their conversion to nonforest uses if local land-use plans permit. Land that would be managed for commercial forest products totals approximately 99,100 acres, less than the approximately 287,900 acres currently allocated to commercial forest production. The allocation of additional land to uses other than timber production is based on current research data.

Forestry Program for Oregon Objective: Forest Practices

Assure practical forest practices that conserve and protect soil productivity and air and water quality: Promote forest practices that maintain Oregon's forest values, including forest tree species, fish and wildlife, soil productivity, and air and water quality. The Forest Practices Act and rules are one vehicle for accomplishing this.

Consistency of the Proposed Resource Management Plan

Provides for the use of practical forest practices that meet this goal and meet or exceed the requirements of the Oregon Forest Practices Act and rules of the Oregon Smoke Management Plan, with two possible exceptions:

- Possible inconsistency with the clear cut size and proximity requirement of Section 4 of the Forest Practices Act as revised in 1991. Recent interpretations of that requirement indicate that, for its purposes, "clear cuts" include most shelterwood harvest units so they would also include harvest units with retention of six to eight green trees per acre and even with 10 to 50 per acre. Although BLM harvest units will be fragmented by Riparian Reserves, the 300-foot distance (from adjacent units) requirement in the Act would not cover all units on both sides of intermittent streams; thus, the 120-acre limit might be violated, though the Proposed Plan seems consistent with the Forest Practices Act objective.
- The requirement for smoke management clearance prior to burning slash and need for completion of burning before replanting, may cause delay in reforestation beyond the one year required by the Act.

Forestry Program for Oregon Objective: Timber Growth and Harvest

Promote the maximum level of sustainable timber growth and harvest on all forest lands available for timber production, consistent with applicable laws and regulations and taking into consideration landowner objectives.

Consistency of the Proposed Resource Management Plan

Provides for the use of intensive forest management practices that are professionally and environmentally sound, to promote timber growth and harvest on all forest lands allocated as available for such intensive management, consistent with the plan's goals and objectives.

Forestry Program for Oregon Objective: Recreation, Fish and Wildlife, Grazing and Other Forest Uses

Encourage appropriate opportunities for other forest uses, such as fish and wildlife habitat, grazing, recreation and scenic values on all forest lands, consistent with landowner objectives: A full range of recreation opportunities is encouraged. Where needed to reduce harassment and/or over harvest of wildlife, road closure programs are supported.

Consistency of the Proposed Resource Management Plan

Provides opportunities for other forest uses, consistent with the plan's goals and objectives. Road closures to protect wildlife habitat and other values are emphasized.

Forestry Program for Oregon Objective: Forest Protection

Devise and use environmentally sound and economically efficient strategies to protect Oregon's forests from wildfire, insects, disease and other damaging agents: Use integrated pest management. Minimize total cost plus loss resulting from wildfire. Employ cost-effective fire management policies that emphasize planned ignition fires over natural ignition fires and that consider impacts to the state's forest fire protection program.

Consistency of the Proposed Resource Management Plan

Economically efficient protection strategies would be employed, and integrated pest management would be used. Minimizing total cost plus loss from wildfire would be integral. Planned-ignition prescribed fires would be emphasized over natural-ignition prescribed fires, but the latter could be used to achieve resource and fire management objectives. Cooperation with other fire suppression agencies, including state and local agencies, would help assure cost-effective fire protection and suppression by all parties.

Appendix HH

Relationship of the Proposed Resource Management Plan to Statewide Planning Goals

Statewide Goal Number 1: Citizen Involvement

Description To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process. Federal and other agencies shall coordinate their planning efforts with the affected government bodies and make use of existing local citizen involvement programs established by cities and counties.

Consistency of Proposed Resource Management Plan BLM's land use planning process provides for public input at various stages. Public input was specifically requested in developing issues, planning criteria, and the proposed resource management plan. Coordination with affected government bodies, including the governor's forest planning team, has been ongoing and will continue. BLM has used county planning departments to provide linkage to local citizen involvement programs.

Statewide Goal Number 2: Land Use Planning

Description To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Consistency of Proposed Resource Management Plan The proposed resource management plan has been developed in accordance with the land use planning process authorized by the Federal Land Policy and Management Act of 1976, which provides a policy framework for all decisions and actions. The process includes issue identification, inventories and evaluation of alternative choices of action. Intergovernmental coordination in the planning process is discussed in chapter 5 of the resource management plan/environmental impact statement.

Statewide Goal Number 3: Agricultural Lands

Description To preserve and maintain existing commercial agricultural lands for farm use, consistent with existing and future needs for agricultural products, forest and open space.

Consistency of Proposed Resource Management Plan The proposed resource management plan does not exclude BLM-administered grazing land from grazing use or affect the use of other lands for agriculture use.

Statewide Goal Number 4: Forest Lands

Description To conserve forestlands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with the sound management of soil, air, water, and fish and wildlife resources and provision for recreational opportunities and agriculture.

Consistency of Proposed Resource Management Plan BLM-administered lands in the planning area are predominately forestland and woodlands. The proposed resource management plan would not lead to substantial conversion of those lands to nonforest uses. Conversion areas such as new forest roads and

utility rights-of-way would be limited to the minimum width necessary for management and safety, and the latter limited to existing corridors where practical. The proposed resource management plan is consistent with the state's forestland protection policies, with one possible exception (see Forestry Program for Oregon Objective: Forest Protection in appendix GG).

Statewide Goal Number 5: Open Spaces, Scenic and Historic Areas, and Natural Resources

Description To conserve open space and protect natural and scenic resources.

Programs shall be provided that will:

- insure open space;
- protect scenic and historic areas and natural resources for future generations; and
- promote healthy and visually attractive environments in harmony with the natural landscape character.

The location, quality and quantity of the following resources shall be inventoried:

- land needed or desirable for open space;
- mineral and aggregate resources;
- energy sources;
- fish and wildlife areas and habitats;
- ecologically and scientifically significant natural areas, including desert areas;
- outstanding scenic views and sites;
- water areas, wetlands, watersheds, and groundwater resources;
- wilderness areas;
- historic areas, sites, structures, and objects;
- cultural areas;
- potential and approved Oregon recreation trails; and
- potential and approved federal wild and scenic waterways and state scenic waterways.

Where no conflicting uses for such resources have been identified, such resources shall be managed so as to preserve their original character. Where conflicting uses have been identified, the economic, social, environmental and energy consequences of the conflicting uses shall be determined and programs developed to achieve the goal.

Based on the analyses of economic, social, environmental and energy consequences to Goal 5 resources listed above, conflicting uses of (BLM-administered) lands and resources may be resolved by selection of three management options: (1) protect the resource site; (2) allow conflicting uses fully; or (3) limit conflicting uses. This is achieved by designating with certainty what uses and activities are allowed fully, what uses and activities are not allowed at all, and which uses are allowed conditionally, and what specific standards or limitations are placed on the permitted and conditional uses and activities for each resource site.

Consistency of Proposed Resource Management Plan Natural, historic and visual resources were considered in the development of the proposed resource management plan. Availability of mineral, aggregate and energy sources would continue, but be somewhat limited. Timber and ecosystem management actions would impact natural and visual resources.

Adverse impacts to visual resources, wildlife habitat, potential wild and scenic rivers and state waterways, and unique natural areas would be slight. Water areas, wetlands and watersheds would be protected. See chapter 4 for discussions. Also see Forestry Program for Oregon Objective: Forest Practices in appendix GG for discussion of consistency with relevant sections of the Forest Practices Act and Rules.

The proposed resource management plan attempts to balance conflicting uses in light of their consequences. Conflicting resource uses are most often resolved by protecting the Goal 5 resource site or severely limiting conflicting uses to meet environmental goals.

Even without any tradeoffs to enhance or maintain the existing commercial forest program, tradeoffs would be necessary between Goal 5 resource values. For example, mineral and aggregate resource or energy source access and development frequently conflict with all other Goal 5 values, and strict guidelines for the management of designated or potential wilderness or federal wild rivers may virtually preclude development or active management to benefit other Goal 5 resource values.

Statewide Goal Number 6: Air, Water and Land Resources Quality

Description To maintain and improve the quality of the air, water and land resources of the state.

Consistency of Proposed Resource Management Plan The federal and state water quality standards would be met and water quality would be maintained and/or improved. See Effects on Water Resources for discussion. Burning would have a potential effect on air quality, but without prescribed fire, the effects of wildfires on air quality would increase. The proposed resource management plan would comply with the Oregon Smoke Management Plan and the state implementation plan. See Effects on Air Quality for discussion. Also see Forestry Program for Oregon Objective: Forest Practices in appendix GG for discussion of consistency with relevant sections of the Forest Practices Act and Rules.

Statewide Goal Number 7: Areas Subject to Natural Disasters and Hazards

Description To protect life and property from natural disasters and hazards.

Consistency of Proposed Resource Management Plan Natural hazard areas, particularly floodplains and areas with highly erosive soils have been identified. The proposed resource management plan provides for appropriate management of natural hazard areas. BLM-authorized developments within natural hazard areas would be minimal, with project construction engineering reflecting site-specific conditions and requirements.

Statewide Goal Number 8: Recreational Needs

Description To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts. Federal agency recreation plans shall be coordinated with local and regional recreational needs and plans.

Consistency of Proposed Resource Management Plan The BLM actively coordinates its recreation and land use planning efforts with those of other agencies to establish integrated management objectives on a regional basis. Opportunities would be provided to meet recreation demand (identified in Oregon's Statewide Comprehensive Outdoor Recreation Plan). Projected demand for all activities on BLM-administered lands would be met under the proposed resource management.

See Effects on Recreation for further discussion. There has been no specific interest in development of destination resort sites on BLM-administered lands.

Statewide Goal Number 9: Economic Development

Description To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Consistency of Proposed Resource Management Plan The proposed resource management plan would support reduced levels of BLM resource dependent employment and payments to counties, due to diminished timber production. Employment in rural areas would be most affected. See Effects on Socioeconomic Conditions for further discussion.

Statewide Goal Number 10: Housing

- not considered applicable

Statewide Goal Number 11: Public Facilities and Services

Description To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Consistency of Proposed Resource Management Plan BLM-administered lands may be made available for development of public facilities or services by other parties, if the action would be permitted under the local government comprehensive plan and land use regulations, and relevant state setting requirements.

Statewide Goal Number 12: Transportation

Description To provide and encourage a safe, convenient and economic transportation system.

Consistency of Proposed Resource Management Plan The proposed resource management plan provides for accommodation of identified transportation needs, particularly for transportation of timber where not in conflict with Endangered Species Act requirements, but setting a major new transportation route (e.g., state highway) would require a plan amendment. Major utility corridors were considered and would be designated. The proposed resource management plan supports state policy objectives to restrict use of BLM roads for access to nonresource development that would be inconsistent with state planning goals.

Statewide Goal Number 13: Energy Conservation

Description To conserve energy.

Consistency of Proposed Resource Management Plan Conservation and efficient use of energy sources are objectives in all BLM activities. Although the proposed resource management plan finds some additional rivers suitable for inclusion in the National Wild and Scenic River System, which would restrict the possibility of development of their hydroelectric potential, there are no pending development proposals and those rivers are considered to have low potential for hydroelectric use. Firewood sales would be permitted but firewood availability would be limited by allocation of substantial acreage to limited or no timber harvest.

Statewide Goal Number 14: Urbanization

- not considered applicable

Statewide Goal Number 15: Willamette Greenway

Description To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic, and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

Consistency of Proposed Resource Management Plan The proposed resource management plan would protect BLM-administered lands in the Greenway.

Statewide Goal Number 16: Estuarine Resources

Description To recognize and protect the unique environmental, economic and social values of each estuary and associated wetlands; and to protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.

Consistency of Proposed Resource Management Plan No measurable impacts on estuarine resources from BLM-authorized activities are anticipated.

Statewide Goal Number 17: Coastal Shorelands

Description To conserve, protect, where appropriate, develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters. To reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands.

Consistency of Proposed Resource Management Plan The proposed resource management plan would preserve and protect BLM-administered and other coastal shorelands delineated in acknowledged city and county comprehensive plans and land use regulations. It would close some coastal lands to vehicle use for protection of wildlife habitat and other values.

Statewide Goal Number 18: Beaches and Dunes

Description To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and to reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

Consistency of Proposed Resource Management Plan The proposed resource management plan would comply with this goal. In particular, BLM management direction for the [North Spit of Coos Bay] a proposed component of the Coastal Barrier Resources System, is consistent with management and development guidelines under the Coastal Barrier Improvement Act of 1990.

Statewide Goal Number 19: Ocean Resources

- not considered applicable



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